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THE Shaksgam Expedition of 1937 fulfilled its objects in the fixing and detailed mapping of the country surrounding the Aghil pass and the great glacier system lying immediately to the north of the main Karakoram watershed, between K^2 and the Shimshal pass. There still remained much of the Aghil range to be explored, as well as the mountains stretching to the north-east of the Shimshal pass across the Oprang river, before the map of the main features of the Greater Karakoram could be completed. From the experience I had gained in 1937 it was clear to me that the task would probably best be tackled during the winter, when the rivers, instead of presenting the traveller with impossible barriers, might even be used as high roads by which to penetrate to the heart of the unexplored regions. I mentioned my plans to the Surveyor-General of India on my way through Calcutta to Mount Everest in 1938, and he replied that he was anxious to straighten out the topographical confusion which existed in that part of the main range surrounding the basins of the Hispar, Biafo, and Panmah glaciers. It was obvious that this task could easily be combined with my winter plans, and I submitted detailed proposals to the Surveyor-General, who at once offered me considerable support and encouragement. I therefore decided upon an expedition covering some sixteen months, which was to be divided into four parts. The summer of 1939 was to be spent in the Hispar–Biafo–Panmah area; the winter of 1939–40 was to be spent in the country east of the Shimshal pass; during the spring of 1940 a journey was to be attempted from Shimshal to Leh *via* the Shaksgam river, during which it was hoped to survey that part of the Aghil range lying to the north of the country explored by Mason in 1926; plans for the summer of 1940 were undecided pending political permission to enter certain areas far removed from the Karakoram range.

I asked Mr. Scott Russell to accompany the expedition to assist in the exploration work, to make detailed botanical collections and surveys, and to continue some important physiological researches which he had been making

into the effect of cold climates upon plant growth. Dr. E. C. Fountaine was invited to come as medical officer, to help in the exploratory work, to make zoological collections, and to study certain medical and ethnological aspects of the people of Shimshal. At first I expected to have once more the invaluable assistance of Mr. Michael Spender as surveyor, but at the last moment he found it impossible to come. At very short notice Mr. Peter Mott stepped into the breach and undertook the work of chief surveyor. The Surveyor-General lent the expedition the services of two Indian surveyors: Fazal Ellahi, who had already made a considerable reputation by his mountain surveys and his resource in difficult circumstances; and Inayat Khan, a younger man, but experienced in the type of work to be undertaken. Later Messrs. Campbell Secord and A. F. Betterton joined the party for a short period.

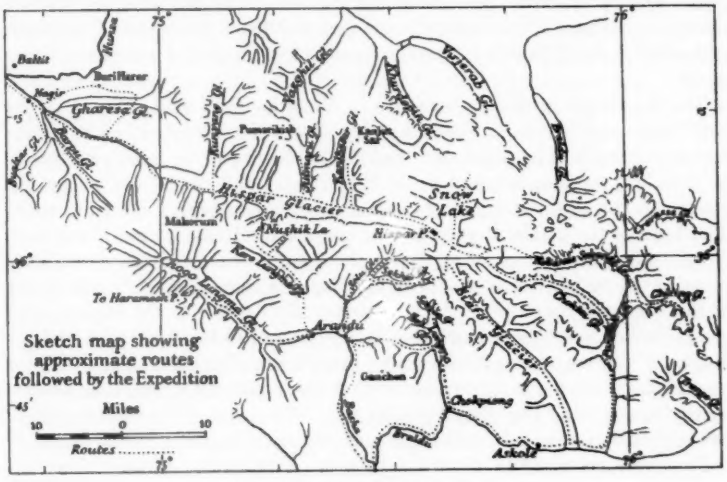
The expedition was financed by grants of money from the Royal Geographical Society, the Survey of India, the Royal Society, the Percy Sladen Fund, the British Museum (Natural History), and the Royal Botanic Gardens, Kew. Mr. R. W. Lloyd and Mr. A. Courtauld also most kindly contributed towards the funds of the expedition. Apart from the length of time it was intended to remain in the field, the estimated cost of the expedition had to be greatly increased by the necessity of providing special winter equipment for the party. Nine Sherpa porters, under my old friend Angtharkay, were engaged from Darjeeling.

Michael Spender, in a report written for the Survey of India upon the position of the Biafo watershed, said: "As compared with the rest of the Karakoram range the Hispar–Biafo glacier system may be considered easily accessible to travellers. Yet any discussion of this region is confused by the unreliability of the surveys not only of these two glaciers but also of the neighbouring systems: the Panmah, Hoh Lungma, Kushuchun Lungma, Khurdopin, and Virjerab basins. These surveys were not even properly based on such G.T.S. points as were available." This shows clearly the state of the topographical confusion in this area, and our task during the summer of 1939 was to fix as accurately as possible the major features of the region and to make a detailed map of the Hispar, Biafo, and Panmah glacier basins. We had with us a Wild universal theodolite belonging to the Survey of India, the Wild plane-table outfit of the Royal Geographical Society, a new phototheodolite hired from Zeiss, and two Survey of India plane-table outfits. For time signals we took a three-valve short-wave wireless set, weighing 30 lb. including batteries, designed by Mr. Matthews of the Royal Geographical Society. It gave perfect satisfaction.

My original plan was to take the whole party as soon as possible across the Hispar pass and to establish a base stocked for at least two months on the "Snow Lake," the basin of the Upper Biafo glacier. From this it was proposed to climb several high peaks which would command views of many G.T.S. points in widely separated areas. In this way, with the Wild theodolite it would have been possible to fix the positions of the peaks climbed and to intersect a large number of other peaks in the distance, thus forming a basis for the accurate mapping of the district. While the surveyors were at work parties would have had plenty of time to visit all the accessible cols in the

district and thus, by using the phototheodolite, to make actual connections with the country beyond the various surrounding watersheds, thereby fixing beyond dispute the relative positions of all the glacier systems in that part of the Karakoram. The original plan however was changed and it was decided instead to carry a triangulation from the Indo-Russian system in the Hunza valley up the Hispar glacier and over to the Biafo. This change proved to be a mistake, and I am further convinced in my belief that the most effective way of exploring and mapping a mountain area of this kind is from a base somewhere in the middle of the area.

The main party reached Nagir *via* the Kamri pass and Gilgit on July 3. On that day Mott and Fazal Ellahi ascended Zangia Harar, one of Mason's triangulation stations just below the junction of the Hispar with the Hunza



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river, the former to start the triangulation, and the latter to start a plane-table survey of the large glacier system which lies south of Nagir. Russell went with them to start his botanical collecting. He and Mott did an astronomical fix on Zangia Harar and arrived at Nagir late on the evening of the 5th. The following day Russell, Secord, and Betterton went up the Barpu glacier system to collect plants and to look for a pass to the Chogo Lungma. Mott, Fountaine, and I set out to climb to Buri Harar, another of Mason's trig stations to the north, and with the object also of exploring the hitherto unvisited Gharesa glacier. We reached Buri Harar on the morning of July 8 and found its position to be totally unsuitable for our purpose. It is on an inconspicuous spur of the main ridge and, though it commands a fine view down the Hunza valley, for which it was intended, we could see nothing of the country towards the Hispar. We moved our camp and after two days reached a prominent point farther along the main ridge to the south. But from there, although we had built a large cairn on Buri Harar, we could not

identify it with sufficient certainty through the theodolite telescope amid the profusion of ridges and gulleys of that vast landscape. All this wasted a great deal of time which was further prolonged by the necessity of selecting and laying out a new base in very difficult country. The two weeks originally allowed for the triangulation seemed likely to be protracted into months. Mott and I returned to Nagir on July 10 while Fountaine went up the Gharesa glacier. Accompanied by Secord we went up the Barpu glacier on the 11th, and on a long ridge dividing the Barpu from the Hispar valley a base about 1½ miles long was measured, which could be connected indirectly to Zangia Harar. This work took two days owing to the difficulties of travelling and setting up stations on the ridge. Further astronomical observations were made for latitude and longitude. I also went up to the head of the Barpu glacier to Fazal Ellahi, who was working there at that time. He had already completed about half the area and had fixed the peaks of the main watershed, which is much farther south than indicated on the existing maps.

The Barpu glacier is very delightful. Along its right bank, almost to the head, there extends a wide ablation valley filled with willows and rose thickets and wild flowers. The roses were then in full bloom and for miles great banks of their gay blossom seemed to fill the valley. Well over half-way up the glacier, in the ablation valley, there is a small village with some cultivation. The head of the glacier is shut in by a great wall of ice-covered mountains, which offer little chance of a pass to the south. There is however an easy route to the nullah which descends to Hispar village. The other big glacier of this region is the Baltar, which stretches right down to the Hispar river and is flanked in its lower reaches by a large area of rich cultivation known as Hopar. Half-way up this glacier a great stone avalanche, continuing to fall for several days, filled the air around with a thick dust haze which hampered survey operations. The Barpu glacier now falls short of the Baltar, which has retreated enormously within the memory of the present Mir of Nagir.

Fountaine returned to Nagir on July 16, after having made a thorough exploration of the Gharesa glacier. He had found that it rose from a range of high peaks, several of which were over 24,000 feet, and is fed by a number of sources. It had evidently retreated much in recent years and several masses of dead ice were found some miles below the present snout. Fountaine found no pass from it towards the glaciers of Shimshal. On July 16 Russell and Betterton started with sixty coolies to lay a dump up the Hispar glacier and to attempt to cross the Nushik La from the Hispar to Arandu in Baltistan. This pass had only once before been crossed by Europeans (Bruce and Eckenstein, members of Conway's expedition in 1892) though it had been several times attempted before and since. The last recorded attempt was by the Workmans, who reported it to be inaccessible from the northern side. Two days later Fountaine and Secord followed Russell's party, and after careful reconnaissance and a good deal of difficulty the two parties together succeeded in effecting a crossing of the pass. The local men would have nothing to do with it, but the Sherpas and the Europeans were able to carry all their loads without help. Russell and Betterton went down to Arandu, and from there Betterton returned *via* Skardu to Srinagar. While Russell was collecting in

the valleys to the south of the Nushik La, Fountaine and Secord did some photo-stations above the glaciers of the Kero Lungma, and also reached another high col in the South Hispar Wall from which they could not descend to the north.

Meanwhile Mott was continuing his triangulation and I remained in Nagir to assist him. On July 21 we moved up to Hispar, and while he was working in that area Angtharkay and I took thirty coolies up the Hispar glacier to lay a dump of food at Kanibasar just below the Hispar pass. I found the Nagir coolies difficult to handle, and in spite of good weather and conditions they were continually making trouble. However the dump was laid and I discharged the coolies and returned down the glacier to await the arrival of the others. The whole party, including Fazal Ellahi, reunited at Makorum (two marches up the Hispar glacier) on July 31. During July Inayat Khan had not been fit, and I decided to leave him for the whole season to work in the less severe country surrounding Nagir and Hispar and the first 10 miles of the Hispar glacier. Fazal Ellahi, using the newly triangulated points, now started his survey. For the next ten days or so the triangulation was carried slowly up the Hispar glacier and Russell was busy with his physiological work, some of which had to be done during the night. Fountaine and Secord went up the Kunyang glacier. They crossed a high pass which led from a tributary to the head of the main glacier. They attempted to reach a high saddle at the head of the latter, which would probably have led them over to the Yazghil glacier, but the danger from ice avalanches rendered the route to it too hazardous, and they abandoned the attempt. They joined the main party on the Hispar on August 7.

I had hoped to have the help of Nagiri coolies in carrying supplies across the Hispar pass and to keep a few of them while we were there. But except for one man they refused to go farther than Kanibasar. They gave various reasons for their refusal, but I am satisfied that the real reason was that nowadays they are frightened of venturing on the upper part of a glacier. We had equipped them with boots, sleeping bags, and tents. The task of carrying all the loads fell upon the Sherpas and ourselves, beside the one Nagir coolie who remained with the party throughout the summer. On August 12 a relay of loads was taken to the top of the Hispar pass, and on the 13th we all occupied a camp there. Two days were spent on top of the pass, during which Mott, Fountaine, and I occupied several high triangulation stations. Fazal Ellahi made use of some of the stations for his plane-table survey, and Russell and Secord ascended the peak on the Biafo–Hispar watershed north of the Hispar pass that had been climbed by the Workmans in 1908. There is no doubt whatever that it was the same peak. We had with us several photographs of it taken by the Workmans from near the Hispar pass. But whereas they estimated the height at 21,300 feet, both our triangulated height for it and Fazal Ellahi's height worked out at 19,400 feet. The weather was perfect and we all got very extensive views from our various stations, reaching as far as Haramosh and K^2. Russell and Secord spent four hours on top of the watershed peak taking photographs, rays, and vertical angles to all the points of interest with the Wild plane-table outfit. The height for the Hispar pass worked out at 16,910 feet, and our fixing placed it 7 miles to the west of

its position on the old map. This shortens the length of the Hispar glacier to 30 miles.

On August 15 we descended to the Snow Lake. The failure of the Nagir coolies had forced us to abandon much of our fuel supply on the Hispar glacier. This necessitated a radical alteration of the original plan and the postponement of several projects in the vicinity of the Snow Lake. We spent four days working there, during which time Fazal Ellahi got well started with the survey of the Biafo. At this time of year the upper glacier consisted mostly of dry ice and was perfectly safe to move about on, so on August 19 we left Fazal Ellahi with all the available food and fuel, four porters and his personal servant, to continue his work. Fountaine, Secord, and I descended the Biafo glacier in three days to Askole, while Mott and Russell crossed the pass discovered by Tilman in 1937 to the Cornice glacier. Travel on the Biafo glacier is remarkably easy, as the smooth white ice extends from its upper reaches almost to the snout. Except for camping, we made no use of the extensive ablation valleys which stretch for 20 miles up the glacier and are well filled with grass and fuel. In these ablation valleys were many bear tracks, though we never saw any of the creatures themselves. At Askole, Secord left us to return to Srinagar, and Fountaine and I started with three weeks' food for the Panmah glacier. I was pleased to find that our dealings with the men of Askole in 1937 had left them with confidence and an apparent affection for us, and there was considerable competition among them to accompany us, which was a welcome change after our recent experience with the Nagiris.

The lower Panmah is typical of most of the valleys of the district. It is desolate and barren, and its bed is filled with gravel and mud deposits, with large alluvial fans split up by the present streams into high cliffs and deep gorges. Typical also are the frequent oases: grassy glades, willow and rose thickets irrigated by spring water. The largest of these is the grazing ground of Panmah, which is about 12 miles up the valley, at the snout of the glacier.

We had with us the Zeiss phototheodolite, and began the survey of the Panmah glacier system with a high station west of Panmah on August 25. Meanwhile the porters moved our camp a few miles up the glacier to the foot of our second station, which we occupied the next day. The weather then broke. We moved our camp across the main glacier to a point opposite the junction of the Choktoi glacier. We were confined to this camp for three days. Angtharkay shot several ibex, which kept us well supplied with meat for the next fortnight or three weeks. On the 30th the weather cleared, and on that day we did a station about 2500 feet above the camp and moved up towards Skinmang at the junction of the Chiring with the main glacier. On August 31 Fountaine, with two Sherpas, went up the Chiring glacier and camped at about 17,000 feet. The next morning he continued up the glacier and soon saw a low col beneath a spur of the mountain that we had identified as Spender's Changtok Peak, which would obviously have led to the north branch of the Sarpo Laggo glacier. Since the view from the col was likely to be limited, he decided to continue up the glacier to a high col 2 miles to the south, the summit of which he reached without difficulty. The descent down the other side to the Sarpo Laggo glacier was no more difficult. The view to

the east included Skyang Kangri (Staircase), K^2, Broad Peak, and the Gasherbrum Peaks; to the west the "Ogre" group, Kanjut, and many other giants. The pass he was on (the long-sought "New Muztagh pass") affords a very easy means of communication across the main Asiatic watershed; certainly the quickest and easiest known route between Askole and the Shaksgam river. On the following day Fountaine climbed to the head of another branch of the upper Chiring glacier and reached a col leading to a tributary of the Panmah glacier. From the head of this however there seemed to be a practicable route to the Trango glacier. Compass bearings and photographs from both these cols will be a great help in drawing the map.

Meanwhile on August 31 I climbed a peak some miles up the Chiring glacier on its northern side. The peak was about 19,600 feet high and commanded a magnificent view of the whole district while providing me with an admirable survey station. On September 1 I climbed another small peak above the Drenmang glacier for the same purpose, and saw far up the Nobande Sobande glacier. It is difficult to know why this glacier is so named, for it is really a continuation of the Panmah. Nor did the name convey anything to the local men. I found many bear tracks along the side of the glacier up as far as the Drenmang. Skinmang, where I had my camp, is a delightful spot flanked by gentle grass-covered slopes which stretch for many miles, and watered by clear streams. On September 2 I crossed the Panmah glacier again and fixed another station 2000 feet above its western bank. Fountaine joined me that evening after three days of strenuous mountaineering.

We then moved down the main glacier, surveying on the way, and camped on the 3rd on the right bank of the Choktoi glacier. On the 4th we carried heavy loads 8 miles up the Choktoi, taking with us a large supply of juniper fuel. Travelling was easy, over smooth white ice. We now discharged the Balti coolies. When we entered the upper basin we were met by a stupendous view of the granite peaks of the Ogre group standing a sheer 7000 feet above the glacier. As we rounded the corner, one after another the ice spires crowning the knife-sharp ridges of the peaks flicked into view, brilliantly translucent in the afternoon sun. The walls flanking the right bank of the glacier were so steep and unbroken that we had great difficulty that evening in climbing to a point sufficiently high for a suitable station. The next day we climbed high above the opposite bank, and on the 6th we reached a small peak, about 18,500 feet, on the Nobande–Choktoi watershed. The weather was fine and our view extended far over the ranges to the north, while to the south the Ogre group showed its full magnificance. We moved to the head of the Choktoi, completed our survey of it, and moved camp to the crest of the col between the Choktoi and the Nobande Sobande, which had been crossed by Desio's party on the Duke of Spoleto's expedition in 1929. The col afforded an excellent position for a station. On September 9 I descended the Nobande Sobande with two Sherpas. An extremely steep ice-slope overhanging a bergschrund made it impossible to climb down in the ordinary way, and we and our loads were lowered by means of our combined supply of rope. Having acted as human belays, Fountaine and Lhakpa Tensing descended again to the Choktoi with the intention of attempting to cross a col to the Snow Lake. A deep gorge near the head of the Choktoi glacier, formed by

sheer granite cliffs, had prevented a satisfactory view of the col, but we knew that there was a deep depression in the watershed at that point. They camped in the gorge that night and early next morning continued through it. They found the topography to be most complicated. The gorge they were in proved to be a subsidiary passage which connected with a large alley leading from still higher up the main glacier, at a point just below an impossible ice-fall coming down from the col. They climbed on to a broad ice-shelf from which they were able to reach a steep ice-ridge flanking the upper part of the ice-fall. They succeeded in climbing this by cutting steps for about 500 feet, and so reached the col at 1.30 p.m. The weather which had broken during the night had not improved, and they were met at the top by a cold wind and drifting snow, which made photographs and compass bearings difficult. The descent to the Snow Lake was easy, and the following day they reached the food dump left by Fazal Ellahi.

Meanwhile on September 9 Angtharkay, Kusang, and I, having been lowered down on to the Nobande Sobande glacier, pitched camp just below the pass we had crossed. The same day we went some way down the glacier and climbed a steep ice-fall of a small tributary glacier flowing in from the north, which provided me with a suitable theodolite station. Again my view extended far across the main watershed to the peaks flanking the Shaksgam river. Our long period of fine weather broke and snow fell in the night. The next day, still carrying a large load of juniper wood collected near the foot of the Choktoi, we pushed on up the Nobande Sobande, making for an obvious gap at its head. Travel on this glacier was very easy; there was only one badly crevassed area, and that we had avoided by crossing from the Choktoi. We reached the col without difficulty, but were met on the top by a heavy wind blowing from the west. Sending the Sherpas on to find a route down the other side, I set up the theodolite in a small bergschrund which was sheltered from the wind. Though heavy clouds hung over the peaks and mist frequently obscured the whole scene, I was able to observe sufficient angles to fix my position and to take the necessary photographs. The descent on the west side of the col was difficult, but by lowering our loads from ledge to ledge down the steep ice-slope we were able to reach the glacier and camp there before dark. On September 11, in drifting cloud and snow, we crossed the Snow Lake and reached the dump at 4.30 p.m. Fountaine and Lhakpa Tensing were already there. There was also a note from Russell saying that he was on his way to our base on the Hispar glacier to fetch supplies. For the next two days bad weather confined us to our tents, but on September 14 Fountaine was able to start down the Biafo to join Mott. Eighteen inches of new snow had fallen covering the features of a badly crevassed area below us, and he had considerable difficulty in the first part of his journey. Late in the evening of the 15th Russell and two Sherpas arrived from across the Hispar pass, which was heavily covered by new snow. He brought news of the outbreak of war, which he had heard by wireless. The news, though not altogether unexpected, was a considerable shock. We had been in the field only a few months, but European politics already seemed very remote, and it was hard to realize the meaning of the disaster. It seemed obvious that we must abandon the expedition, but the party was too widely separated for immediate

recall, and as less than a month was necessary for the completion of our summer programme, I decided to carry on until we were reassembled in Gilgit. First we had to wait for Fazal Ellahi's party, so that we could make a combined crossing of the Hispar pass, which was likely to become difficult with further snowfalls. He was due back at the dump on September 22.

Russell and I with our three Sherpas went up to the northern glacier of the Snow Lake to explore a way across the main watershed. I had hoped that one of us would be able to make a route to Shimshal, for such a passage would have been extremely interesting, but in the present circumstances a further division of the party seemed hardly justified. After two days we camped at the foot of a steep ridge which led up to the watershed. We were held up there by another heavy fall of snow, but on September 20 we made an ascent of the ridge, which presented us with a fine day's mountaineering and a task that took us all our time to accomplish. Angtharkay and Lobsang came with us to help with the work, but even so we were obliged to leave the theodolite halfway up and did not reach the top until 4.30 p.m. We found ourselves on the crest of the main watershed at a point about 19,500 feet high overlooking a wide snow basin on the northern side. This basin was obviously one of the upper feeders of the Khurdopin. Our regret at having decided not to attempt the complete crossing was intensified by the fact that a gentle snow slope was all that separated us from the Khurdopin glacier, which would have led us to Shimshal. The view from the pass was magnificent and extremely interesting. We took rounds of photographs and compass bearings, but a bitter wind and the lateness of the hour prevented us spending long on top. The descent was much easier than the ascent, and by going hard we succeeded in reaching camp before it was too dark to see.

Before going down the next day we climbed to a point which gave us a view of some of the peaks across the eastern wall of the Snow Lake, to which we took angles. We reached the dump on the 22nd, and our arrival there coincided almost exactly with the arrival of Fazal Ellahi's party. He had completed the survey of the entire Biafo glacier and its tributaries from source to snout. His map is a beautiful piece of work. On September 23 we all crossed the Hispar pass to our dump at Kanibasar. From here, on the 24th, Russell set out for Gilgit with telegrams to inform those interested in us of our movements, and to place our services at the disposal of the Government. He had certain physiological experiments to complete at Makorum, but he reached Gilgit on October 3. Meanwhile I stayed with Fazal Ellahi to supervise the completion of his survey of the Hispar basin. First we went up the Kanibasar glacier, where we camped for three nights. Fortunately the weather had improved and held for the next fortnight. I was very glad to have the opportunity of being with Fazal Ellahi for a long time while he was at work. I was impressed by the skill with which he chose his stations, the speed and neatness with which he worked, the accuracy of his fixings, and the extraordinary energy which he displayed. Next we went up the Jutmaru glacier, and here, as on the Kanibasar, we found that the topography bore little resemblance to that portrayed on the existing maps. The watershed at the heads of both these glaciers was very high indeed, and at only one place did I see a chance of reaching it; though there was not time to attempt to do so. At the head of the

Jutmaru we followed for miles the tracks of some creature in the fresh snow. The tracks were a good deal bigger than those made by our boots, and though I suppose they must have been made by bear they did not in the least resemble the bear tracks we had seen in the mud at the sides of the Biafo and Panmah glaciers. The difference was possibly due to the melting of the snow. Fazal Ellahi having completed his work, we returned to Nagir on October 12. At Minapin, one march below Nagir, we met Inayat Khan who, having finished the survey of the areas allotted to him (the whole of the Hispar valley from and including the Kunyang glacier to the Hunza river), had come down to survey the Minapin glacier which he had just completed. We reached Gilgit on October 15, where we found the rest of the party waiting for us.

I had not seen Mott for two months. On August 19 he and Russell had left the camp on the Snow Lake and set off southwards towards the gap in the West Biafo Wall, which constitutes the only practicable pass from the Biafo to the much-discussed Cornice and Garden glaciers (the local names for which are Sokha and Solu respectively). Tilman had first crossed the pass in the 1937 Shaksgam Expedition and exploded the myth, originated by the Workmans, of an enclosed Cornice glacier. It was not at first clear which route Tilman had followed, so the day before they began the journey Russell and I had reconnoitred the most likely col. They camped the first night at the foot of the short glacier leading up to the col, and on the following morning started early. The first part of the ascent was easy, but for the last 300 feet there was a steep ice-slope and some hard step-cutting was necessary. Tilman chose a more gradual route that brought him some way above and south of the lowest part of the col, but he had difficulty in getting down the far side. It was necessary to relay their loads up the final slope and, while the Sherpas were bringing up the remaining loads, Mott attempted to obtain a plane-table fix on the col. Falling snow and the lack of any fixed points for resection made this impossible. The descent from the col presented no difficulties, and they threaded their way easily down the icefall to the dry glacier below. They were now at the head of a narrow valley shut in by giant precipices of rock and snow. A mile from the pass the glacier turned to the left and a steep bluff prevented any further view. When the Workmans, and later Tilman, looked down from a high col at the eastern head of the Sosbon it would have in fact appeared enclosed owing to the curtaining effect of this bluff, but it is hard to understand how the Workmans explained the source of the Kuschuchun Lungma river which they crossed at Bisil.

Mott and Russell's first camp over the pass was on the north side of the glacier, and 2 miles from its head. They found some fuel and a welcome bed of grass after weeks spent above the snow-line. The following day Mott began the survey. There were no fixed points visible, so that he was obliged to lay out a base of assumed length and carry out the whole of this part of the survey to an unknown scale and a relative system of heights. Later, on the Solu, he fixed the scales by tying on to two fixed points which were triangulated on the South Hispar Wall, and while at Askole redrew the map to its correct scale with true contours instead of form-lines. Azimuth he obtained by simple observations on Polaris. The whole of this survey would have been rendered far more difficult, if not impossible, without the assistance of

the Wild telescopic alidade which enabled him to carry out a graphical triangulation, and fix the relative system of heights with considerable accuracy.

One of the most pleasant aspects of the Sokha and Solu glaciers is the amount of vegetation on the lower slopes. Flowers of every colour and form were a constant delight to the eye during the climbs to the survey stations, and provided Russell with a magnificent field for his botanical work, while a mass of willow and juniper served as an endless source of fuel.

Six miles down the Sokha glacier from the pass a steep and very crevassed tributary glacier descended from a cirque surrounded by gothic pinnacles of rock which Mott was to see again from the west arm of the Sosbon. There are two further tributary glaciers joining the Sokha on the south side. Russell ascended the most westerly of these in the hope of finding a pass over the watershed, but the col he reached (16,500 feet), contrary to expectations, proved to be on a subsidiary ridge south of which a stream led down to the Basha valley.

On the sixth day the party descended the ablation valley on the right bank of the Sokha glacier, reaching the Solu which they crossed, and made camp in the ablation valley on its west bank. The following morning, while Russell continued his botanical collecting, Mott proceeded up the Solu far enough to see round the bend, a mile from its head, where the glacier takes a sharp turn to the east. From his plane-table station, on a hillside surrounded by willows, grass and flowers, he could see the whole of the basin hemmed in by the Biafo rock wall, and the col Tilman reached from the Snow Lake. It is doubtful whether a descent west from the col is possible owing to the very formidable ice fall at the head of the Solu. Tilman did not attempt it. They came across many fresh bear tracks, which are common in this area, though the animals themselves were not seen.

On August 27 they moved down to the snout of the Solu glacier where there is quite a large grazing village named Dabados, where they were able to buy fresh food. They spent two days there rounding off the survey of the two glaciers, and then descended to the Basha valley, whence they travelled to Askole by the normal route. At Askole Russell left Mott and proceeded up the Biafo to meet me on the Snow Lake. Mott returned down the Askole valley as far as Chokpiong to survey the Hoh Lungma and Sosbon glaciers. From his first station on a ridge west of the Hoh Lungma nullah he was fortunately able to pick up Kanjut Sar and Conway's Ogre which, with Ganchen, gave him a perfect fix. The view from this station was magnificent, the whole area to be surveyed being visible. Four main glaciers drain into the Hoh Lumba river. The largest of these, the Sosbon, flows southwards and, at its head, splits into two arms which are divided by a narrow rock ridge. The western arm flows beneath the pinnacles the party had previously seen from the Sokha glacier. It was from a col above its western arm that the Workmans and Tilman looked down on to the head of the Sokha. Tilman took the western arm of the Sosbon for the Hoh Lungma, but according to local tradition the name refers to the glacier flowing north-east from Ganchen. The Hoh Lungma is joined by another glacier, flowing from the west, named the Tailbu. Two weeks later Fountaine ascended this glacier and crossed a col (17,000 feet) at its head to the Basha valley. South of the Hoh Lungma a

smaller glacier, the Chongahanmung, drains into a wide sandy flat. In Spender's compilation the name Zarn glacier appears to refer to this glacier. Owing to bad weather it was two days before Mott was able to get a second fixing. There were several heavy snowfalls and the temperature dropped. At the end of a week he completed the survey of the Hoh Lungma and its adjacent glaciers and moved camp to the divide of the Sosbon. From the top of the ridge he was again able to check his position in relation to Kanjut Sar. Fountaine meanwhile had descended the Biafo glacier after leaving me on the Snow Lake, and on September 18 met Mott in the Hoh Lungma valley just below the glacier.

It had been intended that Mott and Fountaine should work together from now on. But unfortunately Mott had developed a form of septic rash which forced him to lie up for several days, and as the time for the return of the expedition to Gilgit was drawing close it was decided to abandon the proposed survey of the Kero Lungma glacier. When he was somewhat better Mott completed his work in the Hoh Lungma area and made his way back to Gilgit *via* Rondu and Astor, crossing the Ganto La (above the Basha valley) and Harpo La on the way. Lhakpa Tensing, who was suffering from severe toothache, remained with Mott while the other two Sherpas went with Fountaine.

The latter party made their way up the Hoh Lungma glacier and camped about a mile from a steep col at the head of the Tsilbu, which is flanked by Hikmul Peak on the south and a low rock ridge on the north. The next day they set out to cross the col (later named the Hikmul pass). The first one and a half hours were through deep snow, but after that the ground steepened and they had to cut their way up an ice-slope covered by a thin layer of loose snow. After negotiating two difficult bergschrunds, some rocks and a steep gully, they reached the top of the col, from which Fountaine took a round of photographs and bearings. To the east the Ogre Peaks could be seen, while westwards they had a fine view up the Chogo Lungma glacier to Haramosh. It was surprising to see that a few miles from its snout there was a right-angled bend in the glacier. After descending the col on the other side they reached the snout of the glacier by evening. The valley they were in was exceedingly steep and dropped 8000 feet from the col they had crossed to the Basha valley, in a distance of less than 4 miles. This made the descent to the village of Bisil difficult. From Bisil to Arandu the party had further trouble owing to the fact that a rope bridge between the two places was down.

From Arandu Fountaine and the two Sherpas started up the Chogo Lungma on September 26 to attempt to cross the Haramosh pass at its head. They took with them enough food for ten days and carried heavy loads. They followed an ablation valley which ran along the northern bank of the glacier and provided them with an easy route. On the first day they camped early, about 3 miles up the glacier, so that they might prepare a large supply of *tsampa* in order to conserve their paraffin when they got beyond the wood fuel in the higher reaches of the glacier. The next day they continued up the ablation valley, which was wide and well wooded. About 5 miles above its snout the main valley took a decided turn to the north, confirming what they had seen from the Hikmul pass. They passed several deserted shepherd

villages during the day and camped that night by the last willow tree on the north side of the glacier, about 10 miles from the snout. They had left the last of the juniper 2 miles lower down. Here again they found a great number of bear tracks. A little farther on they left the ablation valley and proceeded up a band of white ice on the glacier. At about this point a large glacier joins from the south, at the head of which they saw a col which on their side appeared to be practicable. On the night of September 28 they camped on the south bank, at a point about 2 miles below the junction of Haramosh. On this side of the glacier at about 13,500 feet there was still plenty of willow. The following day they went up the Haramosh glacier and camped on its north bank about 5 miles below their pass, which they reached on September 30 after a laborious trudge through deep snow. The view down the other side of the Haramosh pass presented a dramatic contrast from the great glacier they had just come up. Directly below them at the foot of a steep rock face was a thick jungle. The willow and birch trees in their autumn foliage filled the bottom of the valley with gold and red for 4 miles, where the colour changed to the dark green of pine forest. Beyond this deep well of colour Dobani stood in splendid isolation. To the south stood the mighty cliffs of Haramosh draped in hanging glaciers. Later from one of these they saw an avalanche fall which travelled 4 miles down the valley. They climbed down the rock face, which was quite difficult, and in places dangerous owing to falling stones and ice, and reached the valley 4500 feet below by nightfall. Three days later they reached Gilgit, when for the first time they heard news of the war.

It was difficult in Gilgit to get much idea of what was going on in the outside world, or whether we were likely to be required either in India or in England. However it seemed obvious that we must come back, though it was a bitter disappointment to all of us to have to abandon an expedition which had promised to be one of unusual interest and value. But for all that we are lucky to have been able to snatch a few more months of life from the wreck of the future. The summer part of the programme had been a success. I think that it may be fairly claimed that the geographical problems surrounding the Hispar, Biafo, and Panmah basins have been cleared up once and for all. Triangulation was carried from the Indo-Russian system in the Hunza valley, up the Hispar to the head of the Biafo glacier, which has made it possible to fix the major features accurately; 1750 square miles of this country were surveyed in detail; and several interesting new passes were crossed. A summary of Scott Russell's botanical work is given below.

APPENDIX: BOTANICAL INVESTIGATIONS

R. Scott Russell

The flora of the Karakoram is small compared with that of the central or eastern Himalaya, and few of the species are sufficiently striking to interest the horticulturist. Thus the Karakoram offers but little attraction to the botanist whose primary object is to collect new or beautiful species. To the ecologist however it presents many interesting problems, and its position north of the main Himalayan chain and bordering on Afghanistan and the great deserts of Central Asia makes it an important link between floras of entirely different types.

The majority of botanists undertaking intensive investigations in the Himalaya have been interested primarily in finding new plants, and have therefore been attracted by the more luxuriant valleys farther east. Thus large areas, especially in the higher and more inaccessible parts of the Karakoram, are entirely unknown. The collections of dried plants made by a number of expeditions are of great interest, but in the majority of cases botanical work was but a secondary object, and the collections were consequently small. Thus when we visited the Karakoram in 1939 there was a virtually new field for investigation.

The work I proposed to carry out was divided into three sections: the collection of all flowering plants within the area, an ecological survey, and certain physiological investigations. The curtailment of the expedition due to the European War caused much of the programme to be abandoned. The physiological studies, in which it had been planned to make observations at all times of the year, were especially affected; but the work planned for the summer was completed. Dried plants were collected mainly at altitudes above 11,000 feet from the basins of the Barpu, Hispar, Kero Lungma, Sokha, Solu, and Biafo glaciers, and in the later part of the season the seeds of the most interesting species were gathered. The main herbarium collection will be kept at the British Museum (Natural History), while the seeds are being distributed by the Royal Botanic Garden, Edinburgh. The dried material, representing 870 collections, together with the appropriate field notes, will enable a description of the ecology of the area to be prepared. The full results of the work will be published later, and it would be out of place in this *Journal* to consider them in detail. Some brief description of the general type of vegetation in the region may however be of interest.

The most important factor controlling the development of vegetation in the Karakoram is water supply. In many parts desert conditions prevail and almost everywhere the effect of water shortage is marked. This situation is readily explained by the geographical position of the range. The moisture-laden winds come from the south, the northerly winds, which have crossed the great deserts of Central Asia being dry. To the south the high ranges act as a rain curtain, so that little rain reaches the main Karakoram chain. This curtaining effect is well shown as one approaches the Karakoram from Kashmir; on the hills above Srinagar there are well-developed pine forests and an abundance of alpine plants, while in the Indus valley and at Gilgit the hillsides are generally barren. The rainfall in Gilgit is from 4 to 7 inches a year. It may be noted also that the humidity of the atmosphere in the Karakoram is generally low, due to the strong insulation. In July, at the altitude of 12,500 feet on the Hispar glacier, the relative humidity was below 10 at noon on clear days. In consequence of these conditions the flora of the Karakoram consists of plants which have low water requirements. This situation is in strong contrast to that found in the central or eastern Himalaya, which lie farther to the south and receive the full force of the monsoon. The entirely different types of vegetation found in the two regions are thus accounted for.

In the areas studied on the present expedition little or no vegetation occurred on open hillsides unless a constant water supply was provided by snowfields on the higher slopes. The most varied flora was usually found in the ablation valleys flanking the glaciers. Hillsides with unusually varied vegetation were examined on the southern sides of the Barpu and Hispar as well as above the Kero Lungma, Sokha, and Solu glaciers. In these localities water supply was provided either by seepage from the snowfields or by springs. The aspect of the slopes protected them from excessive insolation. These areas varied in altitude

from 12,000 to 15,000 feet. The highest level at which plants were found was about 17,000 feet.

The most important trees and shrubs were willows (*Salix*). A number of species were collected, varying from small shrubs to small trees 15–20 feet high. Considerable areas of hillside were covered with willow shrubberies beneath which a wide variety of herbaceous plants was found. Juniper (*J. pseudosabinus*) was less abundant but occurred, often as isolated trees in rocky places, over the greater part of the region, while at the lower levels roses were common. Other trees were in general absent. A few of the more interesting herbaceous species may be mentioned, but it should be noted that, until the collections are compared with type material, the specific determinations must be regarded as tentative. Between the altitudes of 12,000–13,000 feet a species of aconite (perhaps *Aconitum violaceum*) with striking bluish-purple flowers was often common. It was particularly abundant in the Sokha valley. *Papaver nudicaule* was collected in many localities, but it was nowhere abundant; no other poppies were found. In almost all localities between 12,000 and 14,000 feet the blue geranium (probably *Geranium pratense*) was one of the most common and most striking plants. Several epilobiums were collected, including the large-flowered *E. latifolium* growing usually on semi-stable moraine. The family Leguminosae was well represented, mainly by species of *Oxytropis*, *Hedysarum*, *Lathyrus*, and *Astragalus*. A number of species of *Potentilla* occurred commonly. In dry localities *Sedum* species were among the most important plants. A number of asters were abundant in grassy slopes. Another interesting composite was *Saussurea*, which grew only above 15,500 feet. Several primulas were found, usually in moist localities at fairly high levels. *Acantholiumum lycopodioides* was a striking plant in dry localities between 10,000 and 11,000 feet. The family Gentianaceae was represented by several gentians of which the most widely distributed was the small *Gentiana venusta; Pleurogyne spathulata* occurred in restricted areas mainly by the Sokha glacier. Striking blue patches of *Martensia Tibetica* were found in a few places above the Hispar glacier, while a small species of *Myosotis* was abundant in the ablation valleys. At the margins of *Salix* shrubbery species of *Pedicularis* were frequent.

The purpose of the physiological investigations was to show the effect of the environment on the metabolic processes which control plant growth, more particularly those by which carbohydrates are formed and utilized. A large amount of laboratory analysis will be necessary before the results of this work are available. Similar investigations were carried out in the Arctic oy the Imperial College Expedition to Jan Mayen in 1938, and one of the interesting applications of the present results will be to compare the effects of high mountain and arctic conditions on plant growth. The environments are similar in many respects, notably the long cold winter, but on the other hand the quality and duration of sunlight, most important biological factors, are markedly different in the two cases. Field investigations of this type are at present seldom undertaken, but eventually they should lead to a full understanding of the manner in which different climates affect the growth processes of plants.

As by no means all parties whose object is geographical exploration include a botanist, it is appropriate to consider the importance of botanical work in geography and the type of investigation which can be undertaken on an expedition travelling in difficult country. In a recent discussion (*Geogr. J.* 91 (1938) 338) Sir Francis Younghusband defined the function of geography as being the description of the surface of the earth. Except in heavily glaciated or desert regions the plant-covering is one of the most important features of the earth's surface. Geographers naturally regard with little interest botanical publications

which consist solely of enumeration of species occurring within a given area. But if the botanist is prepared to devise physiological and ecological methods which can be applied in the field he is able not only to describe the flora, but also to discuss the vegetation in relation to the prevailing climate on the one hand and the nature of the underlying rocks and the development of land-forms on the other. Such results should be of value to the geologist, the meteorologist, and the geographer.

A light expedition naturally sets rigid limits to the amount of collecting material and other apparatus the botanist can employ, but even so much valuable work can be done. Careful organization is much more important than elaborate equipment. On the present expedition the equipment required for the summer totalled little more than two coolie loads, while on journeys from the base depot on the Hispar glacier never more than one load was taken. Nor is an elaborate camp necessary. Though it is no doubt more pleasant to sort one's specimens sitting at a table, the job can be done with equal efficiency reclining on a sleeping-bag in a bivouac tent. I would disagree with the opinion recently expressed that the conditions of a light expedition are not conducive to exact scientific work. In the Karakoram the amount of time and energy expended in transporting camps and quelling disputes among coolies increases in geometric ratio to the size of one's *bandobast*. It is a tribute to the powers of organization of many early explorers that, with their elaborate outfits, they had time to bring back any results at all. In this connection it is of interest to note that in the arctic, where detailed botanical work has been carried out more often than in the Himalaya, small and mobile expeditions seem in general to have been more successful than parties with elaborate bases. At the same time it is obvious that where transport presents no difficulties nothing is to be gained, and a great deal may be lost, by the indiscriminate restriction of supplies and equipment. Such conditions are however seldom realized in difficult mountain regions.

DISCUSSION

Before the paper the PRESIDENT (Field-Marshal Sir PHILIP CHETWODE) said: Early in the summer of 1939 Mr. Eric Shipton, with Mr. Scott Russell, Mr. Peter Mott, and Dr. E. C. Fountaine, returned to the Karakoram to resume and if possible complete the explorations upon which he gave us so important a paper on 10 January 1938. He had filled in several blanks upon the map of the northern face of the Karakoram range and the Shaksgam region, already known to us from the discoveries in 1887 by Sir Francis Younghusband and by Professor Mason in 1926.

In September 1939 Mr. Shipton heard of the outbreak of war and felt it his duty to return to place himself and his companions at the disposal of the Government of India. We have recently heard that after spending some months at Dehra Dun working up and handing over his survey results to the Survey of India, he is now under orders to join the Indian reserve of officers for training. His companion, Mr. Scott Russell, is primarily a botanist interested in the physiological side of that science. He came home two or three months ago, and we are fortunate in having him here to give us the substance of Mr. Shipton's paper. He is shortly to return to the East to take up a scientific appointment.

Mr. Scott Russell then read the paper printed above, and a discussion followed.

Sir FRANCIS YOUNGHUSBAND: It has been a delight to me to listen to the interesting lecture and to see these beautiful slides. I visited the country over fifty years ago, and in those days the photographic apparatus of the portable type had not been invented. Therefore when I lectured to the Royal Geo-

graphical Society in 1888 I had to rely upon my own description, and being unable to illustrate the country by means of lantern slides, I said that the region I had traversed resembled hundreds of Matterhorns put together. That was the nearest I could get to it, and I remember seeing Mr. Douglas Freshfield raise his eyebrows at such a description. But after looking at the slides shown during the course of this lecture I am not so sure that I was wrong. You will have noted the extraordinarily spiky character of the peaks in that region.

I was glad to hear the lecturer mention that great surveyor Colonel Godwin Austen, of the Survey of India, who was the original explorer of this region. He did not get over on to the far side of the Himalaya, but surveyed all this part on the near side. On the map he then made all other maps have been founded.

I was led to doubt as I listened to the lecture this afternoon whether it is advisable to send such large expeditions into those regions. Perhaps it would be better to confine one expedition to making the map, another to botanical purposes, another to zoological, and so on. It is really a great tax upon the peoples of the country to be taken out of their homes and carried across most inhospitable regions at great risk to themselves. I would also suggest that a great deal more use should be made of the men of Hunza. They in my time were the raiders who crossed into Central Asia. They made marvellous expeditions across the mountains, with very little food, and had to return carrying all the booty they could. They are most hardy men and good mountaineers; and their diet, as it happens, is perfect. I should say that just as a good deal of use has been made of the Sherpas, so in future more might be made of the men of Hunza who are there on the spot.

The object of my journeys in 1887 and 1889 was to ascertain if there was any way by which the Russians could send an expedition across the Himalaya. I think from the slides you have seen this afternoon you will realize that that is impossible so far as the region visited is concerned. I came across the old Muztagh pass a little farther to the east. I did not go up the Biafo glacier beyond the snout of the Panmah glacier to discover the "New Muztagh pass." But I saw quite enough to be able to report to the British Government that there was no possibility of Russian forces being able to cross the range.

I thank you very much, Mr. Scott Russell, for the paper you have read. It has given us a most encouraging idea of what can be done in the region, and we look forward to other expeditions going there.

Professor KENNETH MASON: In the first place I should like to congratulate Mr. Shipton and Mr. Scott Russell on their fine performance and their excellent survey work in difficult country. The map that they had to commence with was mainly a compilation of Lord Conway's very rapid plane-table traverse up the Hispar, down the Biafo, and up the Baltoro glaciers, and of the Workmans' surveys, of which we have heard to-day. The latter, unfortunately, were not trained surveyors. It was not until 1912–13 that we were able to take a really accurate triangulation up the Gilgit and Hunza valleys. By the way, the stations mentioned by the lecturer in the Hunza gorge were not visited by me but by my assistant, Mr. V. D. B. Collins. I worked back from the Pamirs and joined on with his work farther north. Our stations on each side of the gorge were not very high; we made a rule to go no higher than we had to. The country is extremely difficult. We were observing to light signals, which meant leaving men on the mountain-tops, perhaps for a week on end, ready to show a lamp by night or a helio flash in the sun by day. The average height of our stations was as low as 17,000 or 18,000 feet, but we had to carry up heavy theodolites. It is a very different matter to-day when one can use a light field theodolite for stereo work: the modern mountain surveyor can now climb with a light

instrument, take a round of photographs, and come down. Moreover present-day surveyors can use the points their predecessors fixed, the earlier surveyors could not. We must not therefore be too hard on the Workmans and others who went before. When we joined our triangulation with that of the Russians the probable error was only 1·5 metres, so that we were not far out.

As to Sir Francis Younghusband's reference to the Hunza men, I would emphasize that the Hunza man is much more reliable than the Nagir man as a climber, especially on rock. Only last night I was talking to Sir Robert McCarrison, the expert on diet, on this subject at Oxford; he attributed it firstly to the fact that the Hunza man's diet is better and more suitable than that of the Nagir man; secondly—and this will appeal to biologists—the Hunza man lives on the sunny side of the valley; the Nagir man on the shady side. The Hunza man is bright and laughing; the Nagir man is dour and sad. The Hunza man is a better climber and a happier man, and he will never let you down.

Fazal Ellahi is a magnificent surveyor, as good as the best of Indian surveyors, which is high praise, and a very worthy successor to the old pundit explorers and other excellent men in the Survey of India. His immediate predecessor in the line, who served so well with me, Khan Sahib Afraz Ghul Khan, a recipient of two of our awards, is now tehsildar at Gilgit and anxious to help any one who goes to that part of the world in the future.

I should like to ask the lecturer whether he saw the Yenguts Har glacier, one of the most interesting glaciers of Nagir, in a side valley near the village of Hispar. In 1902 it came forward so quickly that, according to native report, it caught up two old ladies who were running in front of it! I do not altogether believe that story, but there is no doubt that it moved forward 2 or 3 miles in about six weeks. It could be seen advancing. It has been deteriorating since then until it is now 3 or 4 miles farther back. Up in its basin there has been a heavy accumulation of ice and snow; and there is no doubt in my mind that this accumulation must be released shortly. This will happen either in May this year, in May next year, or in May the year after. If anybody likes to be on the spot with a cinema camera, when the "corn is a hand's breadth high," he will be able to photograph something that has never been photographed before.

Captain KINGDON WARD: It is always a pleasure to a botanist like myself to see the younger generation carrying on the work of botanical exploration. I came here full of anticipation to hear what Mr. Scott Russell had to say about the plants of the Karakoram. When I saw the magnificent photographs of snow-peaks and glaciers, bergschrunds and crevasses, I could not help thinking that possibly Mr. Scott Russell was botanizing at a slightly high elevation; there did not appear to be very much flora there. However I gather he was deputizing for his leader and that he had for that reason to concentrate more on the climbing and cartography than on the botanical work. If he had had his own way, I think he would have told us some extremely interesting facts about the flora of the Karakoram.

I was particularly glad to hear Mr. Scott Russell say towards the close of the lecture that people are not only interested in lists of the flowers which grow in these places, but also in the study of their associations and the conditions under which they live. I should much like to have heard something on that aspect. I have always felt that the Karakoram is not really a botanist's paradise, such as the Eastern Himalaya, so I am not proposing to go there to look for plants; it is outside my scope. Nevertheless, I hope that at some time Mr. Scott Russell will have more to tell us about the plants he saw.

Mr. MICHAEL SPENDER: My principal feelings about this paper are of pleasure and gratitude at seeing some pictures of mountains and thus being reminded

that the mountains are still there. Nevertheless, I feel bound to enter into something which is dangerously near to being ponderous, because I should like to relate this expedition to the journeys of previous travellers in the same region. It was Conway who first ascended the Hispar; he made a very good survey indeed; but others came along later and in their efforts at map-making got surveys of the district into appalling confusion. What Shipton did was to tidy up in one fairly short expedition the work of several expeditions. He used his forces and disposed his food and Sherpas so that he did in the course of a short time an amount of work which would have taken an earlier expedition a great number of seasons. It is important that none of this was new work over new country. It was all done simply out of the feeling that it had got to be done; the surveys of this area had to be straightened before he could get on to what he really wanted to do.

Shipton likes going to new country; he likes exploration. When we finished in 1937 we left one or two fascinating problems unsolved. There was the great patch of country near the Aghil pass to which Sir Francis has just referred, which is still unexplored. Looking to left and right from that pass we saw a large area of country still to be spied out and put on the map. That was what Shipton was looking forward to going back to. He had planned to spend the summer of 1939 doing the duty part of the work, and to spend the winter doing the interesting part. That point was not brought out during the paper, so I hope you will forgive me for stressing it now. It is important to me and important, I am sure, to Shipton.

Shipton went to the mountains for their own sake. At a time when so many do things for the wrong reasons—because they will get some *kudos* or promotion or because the newspapers will write about them—it is important that there should be those who insist on doing things for their own sake; that there should be those who insist on removing inessentials, on discarding what is unimportant to the job in hand. That is why Shipton has been a successful leader, a leader with whom it has always been and always will be a great inspiration to work. He spent the summer preparing and laying the foundations, so to speak, laying out his depots in more senses than one, anticipating an interesting winter's work. I want you, in judging the expedition, to realize that it was cut off before the main part had begun and after the foundations had been laid.

Mr. SCOTT RUSSELL: Sir Francis Younghusband has stressed the desirability of using Hunza men as porters. We were unfortunately unable to do so as we were travelling through Nagir, and a healthy rivalry exists between the two states. It would have given rise to great complications had we attempted to take Hunza men through Nagir.

Professor Mason has mentioned the interesting Yenguts Har glacier. Unfortunately when I passed it on my way up to Hispar it was shrouded in mist, and on the way down I was hurrying to Gilgit, so I was unable to examine it. It was however mapped by the surveyor Inayat Khan.

The PRESIDENT: It only remains for me to ask you to thank the lecturer for the extraordinarily interesting afternoon he has given us, and especially for those wonderful photographs. I have had the privilege of actually looking upon those magnificent peaks from a distance because, as an irreverent young subaltern, I went in 1890 to that part of the world, through Kashmir, after a gentleman we knew as Lal Palu, or the Red Bear. Again as Commander-in-Chief in India I spent ten days or so in the dignified and contemplative recreation of fishing in those wonderful streams in Kashmir. For the benefit of those who have not seen the country, I may say that the photographs have not exaggerated it in the least.

SURVEYS ON THE ROMAN FRONTIER IN 'IRAQ AND TRANS-JORDAN

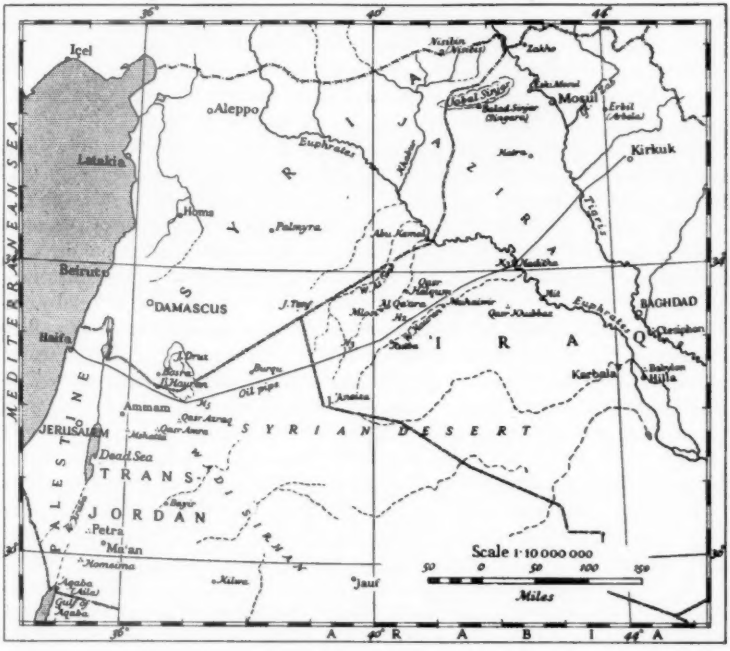
SIR AUREL STEIN

IN the *Journal* for July 1938 a preliminary account was given of the explorations which during March–May of that year I had been able to carry out in search of Roman frontier defences in the extreme north-west of 'Iraq. They had proved that a chain of fortified posts, extending on both sides of the Sinjar range, protected what since Trajan's time had become Roman territory between the Khabur river and the Tigris against Parthian and, later on, Sasanian inroads. They guarded what at all periods was a main route for both trade and invasion between northern Syria and Mesopotamia. These explorations formed the initial portion of surveys planned to extend the very fruitful labours of Père Poidebard, devoted to the remains of the Roman *Limes* in the Syrian desert, into the adjacent parts of 'Iraq and Trans-Jordan.

Père Poidebard's work as recorded in 'La trace de Rome dans le desert de Syrie' conclusively demonstrated the importance of aerial observation and photography in surveys on what is mainly desert ground. The help of the Royal Air Force, which on the recommendation of the British Academy, the Society of Antiquaries, and the Royal Geographical Society, had been generously accorded to me before, was continued in full measure for the further extension of my task from the autumn of 1938 onwards. The long succession of reconnaissance flights which the kind cooperation of Air Vice-Marshal Tyssen in 'Iraq and of Group Captain N. C. Lowe in Trans-Jordan rendered possible, and the many aerial photographs taken on them, proved once more of the greatest value. Great distances had to be covered on the ground within a comparatively limited time in order to secure plans of all ruined structures, as well as exact topographical records of ancient sites and routes in areas as yet inadequately mapped. Hence I cannot feel too grateful for the help received from the 'Iraq Petroleum Company. The enlightened interest shown by Lord Cadman and Mr. J. Skliros, the Managing Director, led to my being provided with the needful transport and the assistance of a very efficient surveyor, Mr. Iltifat Husain, late of the Survey of India and now in the Company's service. As before, my movements throughout 'Iraq territory were facilitated by the local authorities, whose friendly attention and support Mr. C. J. Edmonds, Adviser in the Ministry of the Interior, Baghdad, had enlisted on my behalf. From the Euphrates to the lava belt in Trans-Jordan the stations along the 'Iraq Petroleum Company's pipe-line provided convenient bases for the aircraft in the desert, where shelter and practical help were always readily available. In Trans-Jordan my party passed under the protection of the Desert Patrol of the Arab Legion. That remarkable body now maintains in those desert tracts such security as they have probably never known before. To Major J. B. Glubb, who has created and directs it, I am indebted for much useful advice and guidance.

After a summer busily spent in my Kashmir mountain camp, I returned to 'Iraq at the close of October 1938, glad to resume my task at the easternmost remains of the Roman *Limes*. Just before leaving the Mosul area in May, I

had observed from the air a number of castella stretching south from near the eastern end of the Sinjar range in the direction of Hatra. When closely examined from the ground, it became clear that a series of fortified Roman posts had at one time extended into the desert southwards to within some 20 miles of the great Parthian stronghold of Hatra. It proved to lie along a line forming part of the most convenient route for caravan traffic connecting northernmost Syria and adjacent parts with the central portion of Mesopotamia. Those posts may have played their part as an advanced line of the *Limes* in connection with successive Roman sieges of Hatra. One of them was found to lie quite



close to a large ruined temple, manifestly the shrine *Ad Herculem*, which the *Tabula* of Peutinger, the old Roman route map, shows in a corresponding position as a stage on the road from Singara to Hatra.

The survey was next directed to adjacent ground north of the Tigris, part of ancient Adiabene which is known to have come under Trajan and again later to have passed temporarily under Roman control. A close search of this ground was rewarded by the discovery of two castella manifestly guarding the approach to a gap in the hill range which on the right bank of the Tigris flanked the great highway from Nisibis south-eastward. Not far from them a ruined bridge across the Dohuk clearly attested Roman engineering. A still more striking example of this had been noted before in the bold rainbow-like arch surviving from a bridge thrown across the Wadi al Murr near Eski Mosul.

After aerial reconnaissances from Zakho at the foot of the Kurdistan hills had enabled me to renew my acquaintance with remains of the *Limes* to the west of the point where the present frontiers of 'Iraq, Syria, and Turkey meet, I was free to turn south to the middle Euphrates. To this the pipe-line of the 'Iraq Petroleum Company, passing from the oil fields of Kirkuk to the Tigris and across the desert of Jazira between the two great rivers, offered the most convenient line of access. The road leading from Mosul to Kirkuk passes Erbil, the ancient Arbela. Alexander's famous battle, usually called after Arbela, which gave to him decisive victory over Darius and the final conquest of the Persian Empire, is known to have been fought well to the west of the town and beyond the Great Zab river. By visiting the remarkably flat plain to the south of the present Mosul–Erbil motor road it became possible to secure clear topographical evidence for the exact location of the battlefield, where the old and most direct route connecting ancient Nineveh with Arbela passes across that plain near the Nestorian village of Keramlais.

We reached the Euphrates by the beginning of December, and the pipe-line station K3, near Haditha, offered a very suitable base for the survey of ancient sites along the river. We first followed its winding course south down to the old town of Hit, well known since the earliest historical times for its bitumen springs. It was the starting point for an important ancient trade route through the Syrian desert, which had during many centuries down to modern times linked the centre of Mesopotamia, successively represented by Babylon, Ctesiphon, and Baghdad, with the great desert emporium of Palmyra as well as Damascus. The north-western portion of this ancient route to Palmyra, as far as it lies within the present Syrian frontier in the desert, had been proved by Père Poidebard to have been protected by Roman posts. But I was little prepared when starting on my survey of the eastern portion of the old caravan route to come at Qasr Khubbaz, at a direct distance of less than 40 miles from Hit, upon the comparatively well preserved ruin of a Roman castellum of the type familiar from the Syrian *Limes*. Still more remarkable perhaps was to find close by its side a massive barrage constructed with all the technical skill and solidity of Roman engineering. It formed a dam across the rock-lined head of a wadi, converting this into a huge reservoir. This has silted up with the rain floods of some seventeen centuries; but the barrage built with huge slabs of limestone had survived almost unimpaired. Subsequent expert examination kindly made at my request by Mr. Alexander, engineer-in-charge of K3, has proved it capable of holding upwards of 2 million gallons of water. It was obviously the abundance of water thus assured on otherwise completely arid desert ground which had caused the spot to be selected for a Roman post protecting the trade route. That direct Roman control had at one time, perhaps under Septimius Severus, extended so far south to the Euphrates is a fact of historical interest not proved before.

On following up the ancient route to the Wadi Hauran we found along it two more Roman posts. These were much decayed, but the road itself for considerable stretches was still clearly recognizable by lines of stones on either side and other indications. Near one of those posts marked by the present desert police station of Muhaiwir wells found in the bed of the Wadi Hauran provided evidence of earlier, perhaps prehistoric, occupation in this desert area.

Roman bridge over Wadi al Murr, Eski Mosul

Roman barrage at Qasr Khubbaz

Remains of Parthian fort at Ertaje, above the Euphrates

Roman castellum at Ertaje

Leaving for a later visit the survey of the ancient route which here bifurcates towards Palmyra and Damascus, we turned back from Muhaiwir to the Euphrates. From here upwards most of the valley is confined by high cliffs, leaving room only for narrow patches of cultivable ground between the barren plateaux on either side. Yet both banks are bound to have served from the earliest times as important lines of communication both for trade and military movements. The numerous ancient sites which were surveyed here on both sides of the river right up to Abu Kemal on the Syrian frontier dated from very different periods. The archaeological interest of those likely to have been occupied in classical times is much increased by the fact that we possess accounts of the route which led along the left, or Parthian, bank of the river in the itinerary of Isidorus of Charax, known as the 'Parthian Stages,' and in the record of the Emperor Julian's fateful expedition into Mesopotamia.

Within the great circumvallation of Anqa on the right bank, probably Assyrian or even earlier in origin but still clearly traceable, it was possible to recognize outlines of a Roman fort. Apart from this and ancient fortifications surveyed on two islands of the Euphrates which figure in the account preserved by Ammianus Marcellinus of Julian's campaign, it must suffice here to mention the curious site of Ertaje. Its position corresponds exactly to that of Belesi Biblada, which Isidorus of Charax, writing at the beginning of our era, knew as a station on the "Royal Parthian highroad." Now the circular order of Marius Maximus, a Roman general commanding in Syria about A.D. 213–14, which has recently come to light among the manuscript finds at the site of Dura-Europos, mentions Belesi Biblada two centuries later as a place on the Roman frontier of the Euphrates where a Parthian envoy was to be received and hospitably entertained. That both records relate to the same locality was definitely proved when we found a small castle, manifestly Parthian in construction, perched high on precipitous cliffs above the left bank of the river, and on the gravel plateau just above it a typical Roman castellum. The place had passed from Parthian into Roman hands probably in the course of Septimius Severus' successful Mesopotamian campaign.

Early in January 1939 we left the river and definitely turned into the desert stretching far away westwards. Our work in the desert belt between the frontiers of Syria in the north and Ibn Sa'ud's Arabian dominion in the south was facilitated by the fact that the 'Iraq Petroleum Company's pipe-line for close on 600 miles runs right through this belt, partly in 'Iraq and partly in Trans-Jordan territory. Its well-organized pumping stations afforded convenient bases for the R.A.F. aircraft serving for my reconnaissance flights. From time to time they also provided welcome shelter for my party from the trying rains and bitter blasts of the desert winter. The contrast between our camp conditions and the "Europe comfort" at those little oases was very striking.

After starting again from K3 I first traced the initial portion of a more northerly route to Palmyra protected in Roman times. With it probably connected a line of fortified watering-places, of uncertain date, which as far as it could be followed within 'Iraq territory led in the direction of Aleppo. Then after gaining the pipe-line station H2 for a base, we resumed the survey of the ancient trade route which had led from Hit to Palmyra. I was able to recognize its line clearly both from the air and on the ground also over long stretches

right up to where Père Poidebard had before determined its continuation beyond the Syro–'Iraq frontier. The line proved to have led with characteristic Roman straightness right across the wide sandy depression of Qa'ara, and not as had been supposed before past the ruins of Qasr Helqum.

It was observation from the air which first revealed the remains of a Roman castellum partly overrun by dunes among the drift sand of that curious basin. Apparently the local supply of water, now represented by a bed filled after winter floods, had after a time proved inadequate for permanent occupation of this post. Hence it appears to have been shifted some 10 miles down the wadi to the wells of Qasr Helqum. The remains of a Roman fort found there are of a later type, dating perhaps from the time of Diocletian. Curious, too, was the discovery of a stronghold on a narrow plateau tongue high above the wells. Probably of later but still pre-Islamic times, it may have served for nomadic Arab camps in times of danger.

On the Wadi As Swab, farther on towards the Syrian frontier, we were able to examine closely the numerous ruins of what appears to have been an important half-way station between Hit and Palmyra. A plane-table survey confirmed in most details the plan which Père Poidebard had been able to publish from aerial photographs. It showed that a Roman castellum together with quarters for a superior command had been built on the Wadi As Swab's right bank. It was evidently meant to protect what appears to have been a settlement of small shops and caravanserais clustering on the opposite bank around an earlier defensive structure, probably Palmyrene. The whole curiously resembled the agglomeration of small serais, tea-shops, etc., which has during recent years grown up near the wells and fort of Rutba. This, with its Desert Police post, wireless station, etc., serves now as a half-way station on the much-frequented motor track between Damascus and Baghdad.

After our base had been shifted to the pipe-line station H3 west of Rutba I succeeded in tracing, first from the air and then on the ground also, two Roman posts, both much decayed, at the wells of Mlosi and Ar Ra, on what had remained a direct caravan route from Hit to Damascus in medieval and later times also. A Turkish postal service, maintained down to the middle of the last century and utilized with advantage in Napoleonic times for the Indian overland mail, had followed this line across the desert. Repeated flights along it farther to the west failed, to my regret, to reveal any watering-place or ruins on the desert stretch of more than 60 miles separating Mlosi from the nearest water, the *muhafirs* or temporary flood reservoirs about Jabal Tenf on the Syrian side of the frontier. Similar *muhafirs*, probably of early date, were sighted from the air far away to the south near the range of Jabal 'Aneiza. They could not be visited on the ground, being situated well within the border of Sa'udi Arabia.

On February 14 we moved across into the Trans-Jordan portion of the desert, picking up fresh transport on the undemarcated border line. I much regretted that this border, forming also the dividing line between the Royal Air Force Commands of 'Iraq and Palestine, necessitated leaving behind the handy small Vincent biplane belonging to the former. Of moderate speed and skilfully piloted it gave me while standing in the observer's cockpit just that good outlook forward which search for archaeological objects called for. Up to

the beginning of January it had been piloted by Pilot Officer L. H. Hunt, who had proved as helpful and eager a collaborator in November as during the preceding spring. Subsequently I had reason to feel very grateful to the officer commanding the Royal Air Force Squadron at Amman, for the willingness he showed in arranging for such flights in Trans-Jordan territory as prevailing conditions permitted: service needs arising from operations in Palestine necessarily restricted the employment of aircraft and pilots for archaeological work. Such machines as could be spared for my reconnaissances were mainly of a very fast type and less adapted for observation. But throughout the pilots and the aircraftsmen who took photographs, though changing in accordance with service needs, displayed the same skill and interest in the work.

H4, the station situated close to the eastern edge of the forbidding great lava belt which stretches south from the hills of Hauran, the ancient Auranitis, provided our next base. Here I found myself very conveniently placed for exploring certain stations of an ancient caravan route which Père Poidebard had rightly assumed to have led from the southern extremity of the Syrian *Limes* round the eastern edge of the lava belt towards the important oasis of Jauf, an old trade emporium for central Arabia.

The curious site of Burqu lies within easy reach of H4 at the very edge of the sombre waste of black basalt debris left behind by ancient flows of lava. An exact survey of the site showed that a massive barrage, undoubtedly Roman, had served here to form a large reservoir in the rock-lined bed of the Wadi Minqat. A strong point at the head of the reservoir proved to be a massive tower solidly built and of Roman construction. An irregular circumvallation around it with quarters and bastions dates from Byzantine times, occupation having continued also later. Two smaller halting places also connected with the old route were duly traced. A third, the reported *Al-Qseir* (the small fort), escaped us at first for some time, in spite of the close search made both by flights and on the ground. Finally under the guidance of an experienced old Badu the small *ghadir* or water-hole, within a much decayed but once defensible circumvallation, was duly located. It was found far away from where previous information had caused it to be shown on the International 1/M map in relation to the otherwise correctly surveyed route between Rutba and Amman.

Early in March our camp was moved to H5, the westernmost pumping station on the pipe-line, situated in the centre of that strange lava belt. On the way I could see the new Haifa–Baghdad road in course of construction, solidly metalled like some of the great roads of ancient Rome had been. It is likely to serve an important purpose, as a convenient link between the Mediterranean and the head of the Persian Gulf. Captain Wilson, R.E., hard at work on this portion of the road, had told me of inscribed stones to be seen at an outcrop of solid basalt rock which had been used for a quarry. There I found a large collection of blocks inscribed with lines of Safaitic characters, probably votive deposits of pre-Islamic Arabs. Many Moslem graves on and around the small hillock attested once again that continuity of local worship which no change of religion can affect.

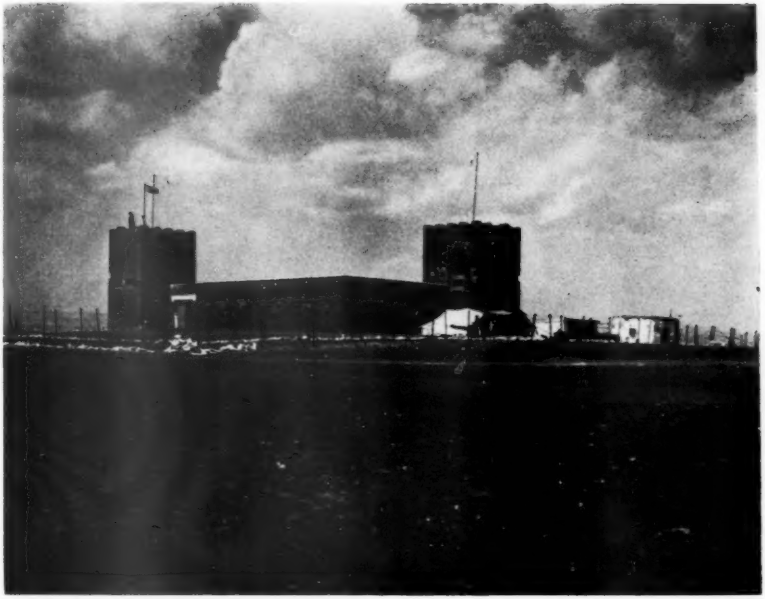
To the north, close to the Syrian border, I was able to visit a series of

interesting ruins of castella. They once formed part of that portion of the Roman *Limes* which protected the border of settled ground in Hauran against nomadic raiders who could always find convenient haunts amid the great waste of lava blocks. Most of the ruins had attracted due notice from archaeologists, but I found a survey of these sites well repaid by what a close study of the constructive features of the forts and their great cisterns could teach, especially as one or two of the sites are datable by inscriptions. There were lines to be traced of Roman roads too, as in so many parts of Syria. But seen from the air it was not always easy to distinguish these from the motor tracks which Major Glubb's Desert Patrol has cleared in a similar fashion. These too serve the same purpose of ready control across difficult lava-covered ground which otherwise would obstruct all rapid movement.

One of the ancient roads is very clearly seen from the air as well as on the ground. Still much used by camel caravans carrying salt to Bosra and Damascus, it leads due north from the freshwater springs of Qasr Azraq and the salt-encrusted ground near the marshes below them. Well known as the conspicuous ruined castle of Qasr Azraq is, a close examination while my camp stood under its walls proved distinctly instructive. In spite of structural changes due to a Muhammadan restoration of the thirteenth century, and of the recent occupation of the ruined site by refugees after the last rebellion in the Jabal Druz, the plan of a typical Roman castellum could still be made out. An altar stone with inscriptions in Latin and Greek, found within the quadrangular court and first copied by Monsieur H. Dussand on a rapid visit, proves Roman occupation in the third century A.D. Another Latin inscription, found by us lying outside one of the bastions, names detachments from legions apparently engaged on the construction of a road and may yet prove datable on exact decipherment.

Qasr Azraq occupies a strategically important point in the depression forming the head of the Wadi Sirhan. This holds a comparatively large number of springs and wells, and consequently has always served as a principal caravan route to Jauf and central Arabia. I was therefore scarcely surprised to find Qasr Azraq the centre of a series of Roman posts and signal stations all so far unsurveyed. One of these ruins known as Qasr Usaikhin occupies the top of an isolated volcanic hill and affords a very extensive view over most of the valleys issuing from the lava belt towards the depression. Owing to its position this small castellum has remained in remarkable preservation. In fact parts would need only re-roofing to be again tenable. On the opposite side of the great basin we found a massive Roman watch-tower and not far from it a circumvallation, probably Nabataean in origin. But a Latin inscription discovered at the gate of a square structure within showed that it had been adapted for a Roman garrison. As a preliminary reading kindly supplied by Père R. Mouterde, S.J., of the Université St. Joseph, Beyrouth, showed, it records construction by a detachment of the III Legio Cyrenaica in A.D. 201. A rocky stretch at the bottom of the wadi below still holds water, said to be perennial, but found by us very brackish.

From here I should have much liked to follow down the Wadi Sirhan and to examine the ruined forts which Arab reports indicate there. They may well mark an outlying *Limes* line meant to protect the important caravan route



Desert patrol post near Qasr Azraq

East face of the castellum at Qasr Azraq

Roman road north of Qasr Azraq

Roman milestone beyond Al Khalidi

towards the large oasis of Jauf. But the permission to visit this ground in Ibn Sa'ud's territory, for which Sir Henry Cox, the late British Resident in Trans-Jordan, had very kindly applied on my behalf, was not forthcoming. So I proceeded at the beginning of April on a tour through the long stretch of desert which descends towards the Wadi Sirhan from the foot of the hills of Trans-Jordan and forms their wide and barren glacis. But for the motor tracks laid out by the Desert Patrol and the Armour Car Section of the Royal Air Force Squadron stationed at Amman it would have cost much time and organisation to traverse this great waste of stones, gravel, and sand. It is devoid of water except at a few widely separated wells. Effective permanent control of it would have been very difficult in Roman times owing to this want of water; hence I was not altogether surprised to find that no Roman posts could be traced in it. For an *Exterior Limes* the Wadi Sirhan running parallel to it on the east necessarily offered a far more suitable natural line.

Curiously enough this part of the desert seems to have appealed to the inherited nomadic taste of some Omayyad Caliphs of the seventh and eighth centuries as an area suited in the spring for camping and hunting. To this attraction several ruined hunting lodges bear testimony. Among them are the well-known ruins of Mshatta, with its relief-decorated walls carried off to a Berlin museum, and of Qasr Amra. The interesting mural paintings which once adorned the latter structure had first been brought to notice by that great Arabian traveller Professor A. Musil. Scarcely any trace of these relics of quasi-Hellenistic pictorial art in the early Islamic period can be seen now. At Qasr Tuba extensive remains were found of a much larger and apparently somewhat later palace erected in the wilderness but never completed. The scanty remains of a fortified serai found at the wells of Bayir below a post of the Desert Patrol also date from later Muhammadan times.

At the site of Kilwa, in the extreme south-east of Trans-Jordan territory, rock engravings, probably prehistoric, and a ruin of Byzantine times had been examined by earlier visitors, including Dr. Glueck, of the American Institute of Oriental Research at Jerusalem, who has published a report of them. My visit to it was frustrated by inadequate guidance which landed the car in deep drift sand, the failure of our water supply preventing a subsequent visit. So we turned to Ma'an, fortunately just before a heavy storm bringing the last rain of the season made the mud flats impassable to motor transport for days.

Near the small oasis of Ma'an, the last place which the Hejjaz Railway, derelict farther south, still reaches, a close plane-table survey allowed us to determine the true character of an interesting and extensive old irrigation scheme which had puzzled former observers. A large area of flat desert ground between two wadis, some 4 miles in circumference, had been enclosed with rough walls and laid out into fields. They were to be watered from a canal brought with great labour and skill from the distant hills above the ruined Roman cantonment of Odhrah. A large reservoir had been carefully constructed to serve for suitable storage of the precious water. This remarkable attempt at colonizing the waste had been abandoned, evidently a long time ago. But no record or tradition could be traced as to the time of the attempt or the cause of its ultimate failure.

I was aware that all the abundant Roman remains in the partially inhabited

hills of Trans-Jordan north of the famous site of Petra and along their eastern foot, together with the main Roman roads in this area, had been studied in 1897–98 by Professors Brünnow and Domaszewski and recorded with much thoroughness in the volumes of their *Provincia Arabia*. But their survey had not extended to the ground between Petra and the head of the Gulf of 'Aqaba. Through this ground had passed the southernmost portion of Trajan's great highway, the *Via Nova*, which connected 'Aqaba, the ancient Aila, with Petra, Bosra, and other important centres. This portion of Trajan's road had never been systematically surveyed, though Professor Musil had come upon its line in places. The fact that these hills had so far remained but imperfectly mapped attracted me all the more to the task of tracing Trajan's road right through from the Red Sea terminus to beyond Petra.

The route chosen for reaching 'Aqaba led us for some 120 miles down to the southernmost border of Trans-Jordan along that derelict portion of the Hejjaz railway which had seen much fighting between Colonel Lawrence's Arabs and the Turks. Ruined posts all along the railway, blown-up viaducts, long stretches of rail upheaved and again repaired, with many a grim relic of desert warfare, testified to the tenacity, remarkable but futile, with which Turkish troops had clung to the line. Yet the permanent way still remains almost intact. It may serve perhaps for centuries to come as a proof of the care with which the old Turkish regime had here carried out a pet scheme of Abdul Hamid's closing years in the face of serious physical difficulties. From the southernmost of the few posts by which the Desert Patrol manages to assure complete security nowadays in a desolate region, we passed by a desert track through bold sandstone hills picturesquely eroded to 'Aqaba. At Ram, where precipitous rock walls raise their fantastic outlines highest, it was interesting to note the ancient sanctity of a fine spring attested by Nabataean rock carvings and a small Nabataean temple recently excavated by Père Savignac.

'Aqaba, a poor village with modest date-palm groves edging the seashore, had nothing to show of the once important port apart from low debris mounds still preserving the ancient name of Aila. The moist heat of the place was oppressive, and I was glad to leave it behind after a visit had been paid up the great rift valley of the Wadi 'Araba towards the Dead Sea and an adequate base measured for the intended plane-table survey. On the scale of 4 miles to 1 inch it was carried with much care by Surveyor Iltifat Husain all along the ground traversed by the ancient road and over the adjacent hills for a total distance of some 120 miles. The work accomplished with no small effort under rather trying conditions did credit to the training received by my assistant from the Survey of India. No details can be given here about the ancient remains attesting the line of this Roman road, nor the special topographical reasons which prove it to have formed part of the direct road opened by Trajan to the Red Sea port. Only some essential observations can find room in this brief account of how we traced what may be considered the southernmost of Rome's *Limes* lines in Asia. Like other strategically important routes constructed and guarded in outlying territories of the Roman Empire, it may be justly classed as a *Limes*.

As we passed up the winding gorge in which the flood waters of the Wadi

Al Yitm have cut their way down to the rift valley of the Wadi 'Araba and the sea, we found both the entrance of that wadi and the meeting point of its two main branches guarded by fortified stations. Though originally Nabataean they proved to have been held also in Roman times. Then ascending westwards in the broadening valley we came by the roadside upon a milestone still complete, but with the friable sandstone too effaced to show more than a few characters of its Latin inscription. Exactly at the distance of 21 miles which the *Tabula* of Peutinger indicates for the first stage on the road from Aila to Petra, we found at Al Khalidi ancient cisterns by the road and on the hillside above it a ruined castellum. It lies by the side of a larger enclosure with less carefully built walls, probably Nabataean. A stone-lined channel brought to it the water of a spring high up in a rockbound ravine.

The next day's drive brought us to the Desert Patrol post of Qweira, built just under the walls of a small Roman castellum (and mainly with its stones) close to a fine cistern adjoining it. On the way there were to be seen successive milestones, all much decayed but exactly at the right distances. In a few places fragments from two or three different milestones were lying close together by the side of the modern track, showing how decayed milestones, all of friable sandstone, had repeatedly been replaced in the course of centuries.

At Qweira the modern track diverges northward from Trajan's *Via Nova* to ascend in steep serpentines to the Shera range forming the watershed and thence to run down to Ma'an. But when we continued in the main valley westwards to the large ruined site of Homeima, we found its distance from Al Khalidi to be 23 miles, or exactly the one indicated by the *Tabula* for Auara, the next stage, rightly located here by others before. The heavy sand at the bottom of the wide valley (difficult to cross with car and lorry) explains why no milestones could be found here. Among the ruins of this site, occupied down to early Muhammadan times, we found a large circumvallation probably meant for a Roman cantonment, with a fine cistern within, but apparently never tenanted.

Professor Musil had already recognized that Trajan's road had led up to the head of the Wadi Qana, whence an ancient aqueduct, still clearly traceable for some 8 miles, had brought the water of a spring down to Homeima. It proved impossible to take our motor transport all along the ancient road up the Wadi Qana, easy as its line would be for camels. But we followed it up on foot to within sight of the spring near the watershed and found it marked by some milestones. It was paved in a few places where the soft alluvial clay of the ground might cause trouble in the rainy season. After having definitely determined the direction of the ancient road, we were obliged to return to the modern one near Qweira and to follow it where it ascends to and crosses the watershed at the pass of Nabq Shtar. The great steepness of the ascent sufficiently explained why the Roman engineers had preferred to take their road up the range farther to the west. No trace of an ancient road could be seen as we followed down the modern road to the spring of Ab al Lesel, where Lawrence had fought his first battle with the Turks, and then on to the ruined site of Sadaqa to which Trajan's *Via Nova* had before been wrongly supposed to run.

When on hired camels we made our way back from there to the watershed

west of the head of the Wadi Qana, we found ourselves at once on the well-marked ancient road. It is well known to the semi-nomadic Arabs cultivating patches of ground at the head of small valleys below the watershed and is called by them *Ar Rasif*. It keeps as close as possible to the watershed at an average elevation of about 5000 feet, preserving a uniform width of 16–18 feet. A double line of stones cleared from this and heaped up along the sides makes it easily recognizable from the air and on the ground also. Winding round any prominent ridges it runs on a remarkably uniform level, thus saving troublesome ascents and descents to baggage animals. Throughout the long stretch to Petra it commanded the ground on either side, just as a proper Roman road wherever possible should. There were remains of watch-towers, and also of a few small posts, to be seen at intervals. Those who had aligned the road did not overlook the advantage afforded by the vicinity of springs at the head of small valleys on either side of the watershed.

Regard for the baggage obliged us to keep with car and lorry to the modern tracks leading down to Ma'an and thence up to Petra. But by climbing from them to heights for suitable survey stations it became possible to carry an exact plane-table survey of the ancient road line and the adjacent ground along the whole of the range as far as Petra and beyond it, as well as close to Shobak. On subsequent flights made from the landing grounds at Ma'an and farther north along the foot of the Trans-Jordan hills the ground observations could be usefully supplemented by a large number of aerial photographs. Striking views were obtained of the wonderful mountain scenery which encircles Petra and its rock-carved necropolis. Years ago I had stayed there, but the fascination of the famous "caravan city" led me to alight and visit it once more.

All the more important Hellenistic and Roman sites of Trans-Jordan have been repeatedly visited and recorded by earlier students. The principal Roman roads within the area accessible in Turkish times had formed the subject of careful investigation by Professors Brünnow and Domaszewski. But I feel glad that rapid visits as far as the existing motor tracks would permit enabled me to secure some acquaintance on the ground also with such principal sites as the Roman cantonments of Odhrah and Lejjun and the castella of Al Kastal and Hallabat. As regards other ancient remains in *Provincia Arabia*, I had to be content with what a succession of flights allowed me to see and have photographed from the air.

Increasing heat and the call of other labours put an end to my work in Trans-Jordan by the middle of May. But I was well enough satisfied that, thanks to the generous help accorded to me, I had been able to follow up those *Limes* investigations I had started more than thirty years before in the deserts of innermost Asia with others on the far-flung south-eastern frontier of the Roman Empire right down to the shore of the Red Sea. Hence fitly I may say here: *finis longae chartaeque viaeque.*

THE CAMBRIDGE (MÝVATN) ICELAND EXPEDITION, 1939

F. L. M. DAWSON

THE primary object of the 1939 expedition to Iceland was to train personnel; the party, in the attempt to be independent, was to dispense as far as possible with local aid, even though the employment of such aid might allow the scientists more time to act as such. The final scheme owed its shape to its originator being a zoologist rather than a geographer, and to his adviser, Brian Roberts, having led the Cambridge expedition which in 1932 made a double traverse of Vatnajökull from the south (*Geogr. J.* 81 (1933) 289–313). Without his generous help the 1939 expedition could never have taken place.

The original plan was for a party of six or seven to spend ten weeks at a base camp beside the north-eastern lake, Mývatn; the biologists analysing the feeding habits of the dozen duck species which occur there in vast numbers, and carrying out careful quantitative ecology in the water and surrounding country, while the geographers were to work out the geomorphology of the latter and try to account for the origin of the former, in addition to making a bathymetrical survey. From the base, detached parties would make pony journeys southwards into the Ódáðahraun, to extend the ecological survey of desert oases begun by the 1932 expedition, and to study the geomorphology of the desert as a whole and particularly of the huge crater of Askja. This lies directly between Mývatn and Hvannalindir, an oasis selected for a visit since it had been studied in 1932 and lay only 20 miles north of the ice-cap. The crater was roughly the same distance north of the oasis and 50 miles south of Mývatn. A biological survey of the crater lake was also proposed.

Askja was first visited by the Icelander Jón of Vidrkaer during an eruption in February 1875, and since then there have been records of twelve visits for scientific purposes. The crater has certainly been entered more frequently than this by ordinary travellers. The approach has always been either from the south or south-west, from Svartarkot in the north-west, or *via* Hrossaborg in the north-east. We proposed to go in a straight line from the north, and our visit would be the second with any biological purpose. Hvannalindir also had records of twelve visits, and in this case it is unlikely that there are any unrecorded. Survey was carried out on several of these, but biological work was only done in 1932. Survey in the strict sense is no longer a profitable occupation for expeditions to Iceland, as the Danish Geodetic Institute will soon have completed a 1 : 250,000 map of the entire country which is of a very high standard of accuracy. The Ódáðahraun sheet has not yet been published, but through the courtesy of the Institute we were supplied with a photographic copy of the manuscript which was of the greatest use.

Organization began in August 1938, in the intervals of Tripos work with which the expedition could not be allowed to interfere. I rode a pony we had purchased 210 miles from Cambridge to Denbigh in seven days, and in April 1939 a trial camp was held for a week at Blakeney in Norfolk. We had decided to take most of our food with us, and we tried out the excursion ration here with some useful results, also our Hudson folding boat; we got to know one another and obtained practice in survey and pioneering, though we did not

learn as much about ponies as we had hoped: one was left behind on the way up and the other vanished during the first night.

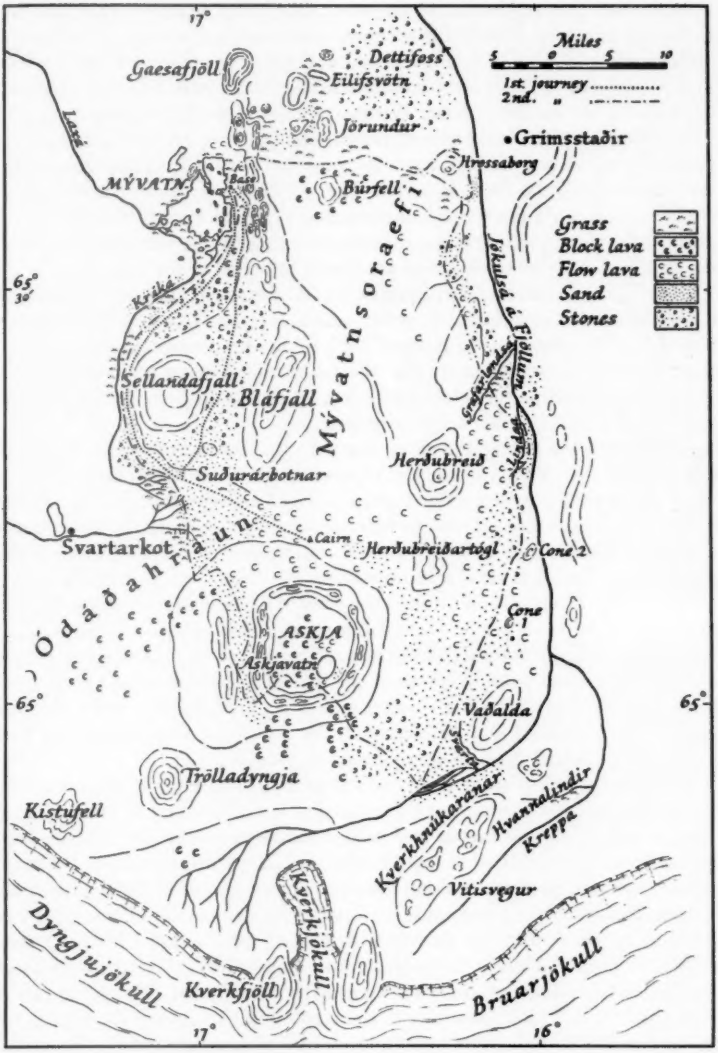
Funds were raised from personal contributions, which brought in £266, and we were very grateful for grants from the Worts Fund (Cambridge University), the Gino Watkins Memorial Fund, Gonville and Caius College, and St. John's College. Of the £421 we raised, £130 was spent on transport of men and gear to and from Mývatn; £100 on general and photographic equipment, £88 on food and fuel, £73 on ponies and fodder, £14 on apparatus, £10 on the trial camp, and £6 on sundries. Scientific apparatus was lent by the Royal Geographical Society, the British Museum (Natural History), and the Geography School and the Department of Zoology, Cambridge. It is a pleasure to acknowledge the zoological help given by Mr. H. C. Gilson and Dr. G. C. L. Bertram. Some camping gear was borrowed from the 17th Hendon (Mill Hill School) Scout Troop. Nevertheless we should not have been solvent but for the kind concessions made by Messrs. Cadbury, Chivers, Huntley & Palmer, and Kodak Ltd.

On 13 June 1939, 36 cases of provisions and 21 packages of other stores were shipped from Hull for Akureyri in the Iceland Steamship Co.'s *Dettifoss*; the personnel followed a week later from Leith in the *Gullfoss*, and consisted of M. M. Spencer, geomorphologist; D. G. Glennie, mineralogist and meteorologist; A. J. Burton, photographer and surveyor; S. C. H. Hood, quartermaster, doctor, and ecologist; J. A. Seldon, botanist; M. M. Swann, zoologist; and F. L. M. Dawson, zoologist and leader.

We reached Reykjavik on the 24th, where we were met and assisted on our way by Herra Stefán Stefánsson, whom I had been fortunate enough to meet at Cambridge earlier in the year. Travelling by coasting steamer and bus, we reached Akureyri on the 26th. In Reykjavik we had discovered that an import licence was now necessary if we were to clear our food through the Customs; this was wired through to us with great promptitude by Stefánsson, and thanks to this and to the very able intervention of Mr. Arthur Gook, the British Vice-Consul at Akureyri, we freed our stores from bond, paying 50 per cent. duty on the food, and loaded them on to a lorry without delay. We arrived at Vogar, on the east shore of the lake, where the farmer spoke English, late on the 26th.

We established the base camp in an acre of tussocky meadow surrounded on three sides by piles of massive block lava and facing the lake on the fourth. The two living tents, and "Tattersall's," which contained the horse appurtenances, were pitched here; the tarpaulin-roofed dining shelter close at hand was walled on two sides with lava boulders, which with sods proved excellent building material. A store hut, 10×6 feet, was embedded in the block lava itself, as was the more ambitious laboratory, 16×9 feet; for the latter's roof we had no tarpaulin big enough, and thatched it with birch scrub. On a 30-foot mound stood the flagstaff, wireless pole, and one of the two Stevenson screens. A week after arrival Swann and I went to Akureyri to collect the string of ponies Mr. Gook had promised to procure for us.

Base life soon settled down into a regular routine. We divided ourselves into geographical and biological watches, functioning on alternate days, for maintenance duties, the duty watch doing scientific work which would not take



Sketch-map of routes on the first and second journeys, based on an unpublished 1/250,000 map of the Danish Geodetic Institute communicated by Prof. N. E. Nørlund, with detail and present courses of rivers by members of the Expedition

them far from camp, often notes and photography in the case of one watch, skinning and pickling in that of the other. When we discovered that the lake contained no deep holes, the accurate bathymetrical survey by telescopic alidade and plane-table was given up, and Glennie undertook one by box-sextant instead. A thin cord plumbline marked by tags in feet was used over the stern of the anchored boat. Geomorphological work progressed steadily. The biological plans had suffered radical change since an international duck protection move was made in 1939, but progress was made in determining the total available duck food material. The weather was exceptionally good; characteristically, a large condensation cloud formed over the whole area at dusk, to be dispersed about ten the next morning by the increasing power of the sun, which shone unobscured for most of the rest of the day.

At the base we had found everything we had expected, except mutton which no one would sell us before September, and at least two things we had scarcely hoped for. One was a good supply of birch timber for constructional purposes; the other was constant hot water. We found this down a 30-foot chasm; it was a clear pool some yards long and 8 feet deep at its deepest. Its temperature was 108° F., and its effect most refreshing.

As much of the survey on which our map was based had been carried out from the air, we thought that the representation of surface conditions was likely to be the weakest part of a good piece of cartography, and decided to make a reconnaissance journey to investigate the going upon the direct route to Askja. Spencer and I took five days' subsistence rations and three of the worst horses, and left on the reconnaissance at 6 p.m. on July 19. The first 3 miles under Hverfjall and through the oasis of Lúdent were over good going, but as we rode down beside Þrengslaborgir we could not go out of a walk, as underhoof we had practically a mild form of block lava. Just after eight o'clock we came to a small patch of grass at the foot of the Seljahjallagil gorge, and halted for an hour, having covered 9 miles. We then headed south into the pass between Bláfjall and Sellandafjall, the mouth of which appeared forbidding and choked up with grey-brown dust-devils.

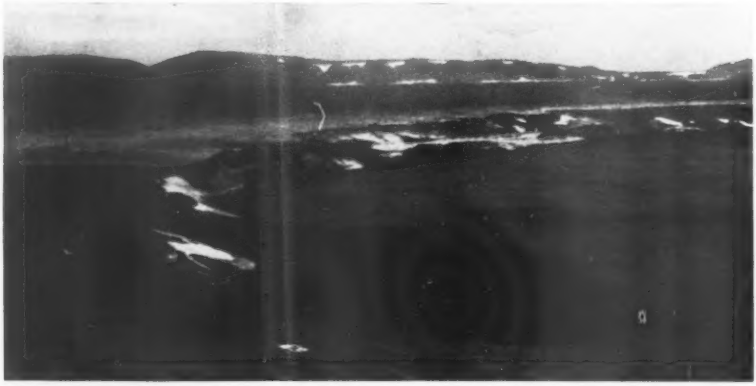
The going was first stone desert and then flow lava; both of these are normally negotiable by ponies, but these samples were the worst of their kind we came across. With the manes and tails streaming straight out into the very strong south wind, we had to leave behind us the marked portion of the map, bearing east and scrambling along the scree slope edges of Bláfjallfjallsgarður. Eventually we led over two spurs, composed fundamentally of fine sand but interspersed uncomfortably thickly with pinkish stones, and with the beasts sliding on their haunches descended into "Happy Valley": a grim piece of dead black desolation; up this cleft we rode for some hours. The going varied from good to very bad, according to the amount of metamorphic rock among the rippled black sand. At its worst uneven pink slabs would extend for several hundred yards without interlude. All the time we were climbing steadily; at first we had seen a few *Elymus* stems growing here and there, but as we got fairly in between the two mountains and could appreciate the great north-south length of Bláfjall, the desert became completely lifeless. At 3.15 a.m. we suddenly topped the pass and halted some few hundred yards from the south-east tip of Sellandafjall. We could see, conspicuous to the southward,

Panorama of Mývatn from Hverfjall, with Vindbelgjarfjall prominent in the centre

Herðubreið from Lindaá

A pool behind Dettifoss

Cinderbed above the south-east corner of Askjavatn



Inside Askja, looking west-north-west; Askjavatn and bounding cliffs in middle distance

Herðubreiðarlindir

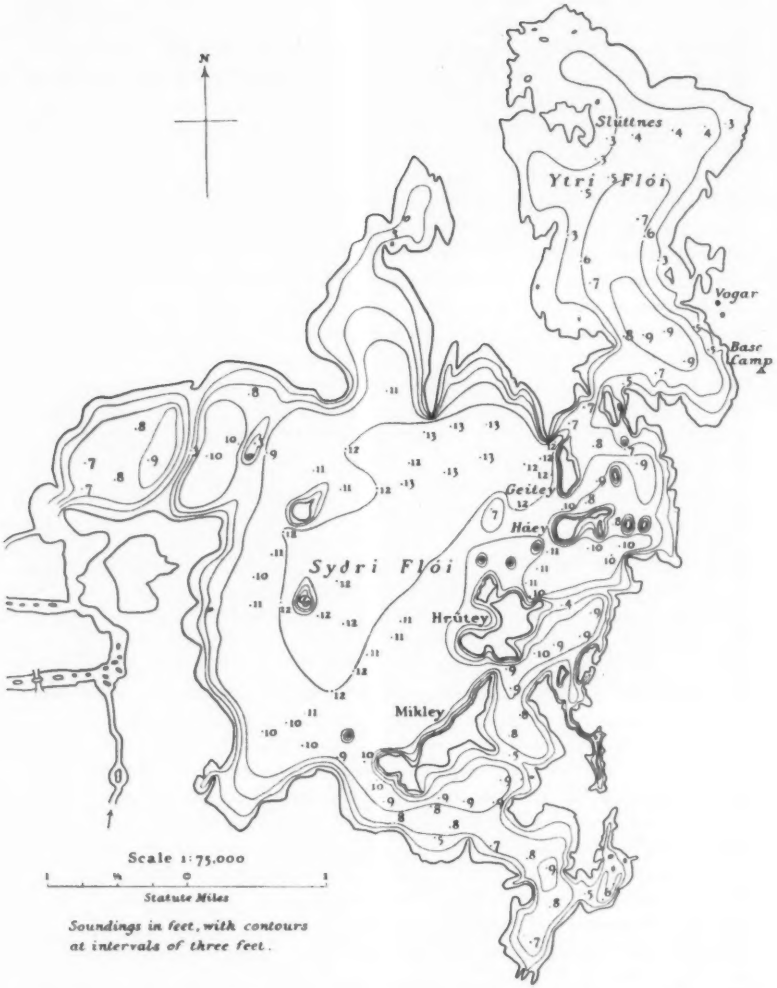
the snow-covered fangs of the Dyngjufjöll surrounding Askja, tinged pink by the rays of the sun which was sinking into the pass behind us. Herðubreið, the sugar-loaf mountain, came into view eastwards. The ground, very firm sand and shingle desert as the map showed, fell away gently before us for 20 miles to the foot of the range. Soon we crossed a ridge and saw the green oasis of Suðurárbotnar, just 30 miles from the base, bearing dead ahead and about 3 miles away. The ponies smelt the water and very soon were cantering towards it. At 4.30 we began to establish camp, having made what appears to have been the first crossing of this pass.

At 4.15 p.m. on the following day we dumped the gear and rode off south-eastwards into the clouds of a sandstorm we had seen and feared from camp. The plan was to ride for four hours towards the crater's north-east tip, its easiest point of entry, and then to return. The map showed flow lava all the way from Suðurárbotnar, succeeding the northern stone desert at the latitude of this oasis; in point of fact we rode for $1\frac{3}{4}$ hours over yellow sand desert. The ponies seemed to mind the sandstorm much less than we did, and although there was no visibility and we had to go by compass they managed to trot. We must have gone quite 10 miles before emerging on to the flow lava proper, to see the Dyngjufjöll now near and bold in front of us. In the middle of this piece of desert we had crossed an oasis of willow scrub and scanty grass extending for about a mile; possibly a result of the season's exceptional weather, it supported several sheep which presumably belonged to the farm of Svartarkot 6 miles west of Suðurárbotnar.

At a walk, we held straight to our course over roughish lava, leaving smoother flows on our right. After an hour the going began to improve and at 7 p.m. we cantered over cinders up to a knoll, whence with binoculars we could see the going equally good to the foot of the pass 3 miles away. We fixed our position with bearings from Bláfjall and Sellandafjall, finding we were just 15 miles from our gear. Then we built a cairn, leaving inside an inscription written on a mousetrap, and after giving the ponies 1 lb. of bread each, began to return on our tracks. We bore somewhat south of these on to the easier flows and stumbled across a pool of water which refreshed our mounts considerably. In returning, as in going, it took an hour to cover the lava to the edge of the sand desert, but on arrival the wind had died and the storm ceased, revealing occasional white heaps of gypsum upon the sand. The ponies were anxious to be back, and galloping at full speed we reached Suðurárbotnar in forty minutes more. The next day, July 21, we returned to the base in eight hours at our leisure *via* the west side of Sellandafjall, thus traversing a route between Svartarkot and Mývatn which has been used not infrequently.

On this first trip the pack-saddle which I had designed seemed as efficient as it had done in England. This was deceptive, as it proved only to suit certain ponies, and after the Askja journey, which started on August 1, had to be discarded. We left at six in the evening once again.

The trouble we had with the packs soon after starting taught me a lesson about insufficiently tested devices, and we camped for the night in the Fram Engjar, only 9 miles from the base. We had decided to go west of Sellandafjall to save mountaineering, and our route was not far to the east of that taken by Delmar Morgan, who went *via* Svartarkot in 1881 (*Geogr. J.* 1882, 140).



Outline of Lake Mývatn from the Danish 1/50,000, with bathymetric contours from surveys by D. G. Glennie

The supernumerary black riding pony was taken back from here, and we left at 2.50 p.m. We crossed first a stony moraine, and then travelled fast over firm shingle which supported sheep pasture in places, to reach Suðurárbotnar in under five hours, a 21-mile stage. We left this camp at 11.30 the next morning. We decided to go for Jónskarð, the north-west Dyngjufjöll pass, instead of following the line of the reconnaissance. We rode for an hour through a comparatively mild sandstorm, and then found a small oasis and lake not marked on the map, though known to man, as we found a very old piece of rope there. Intersections showed this to be $4\frac{1}{2}$ miles due south of the Suðurárbotnar cairn. For three hours we rode south through grass and running streams which overlay an old lava flow. The map indicated only the latter. Then suddenly the going changed to natural furnace clinker and we came up against very solid block lava. We had failed to maintain a sufficient eastern trend, and had to skirt the barrier in this direction for some time, leading our horses. At last we reached good grey sand. We were already among the foothills of the Dyngjufjöll, and soon began to climb steeply. At 6 p.m. we encountered the thaw stream which flows down Dyngjudalur and decided to make camp, although we had only 10 more miles to go over the pass to reach the crater lake; the reason was a poisoned foot which Glennie had developed. We had covered 20 miles and the camp was the bleakest of the excursion.

As Glennie was able to continue, and the Dyngjudalur valley appeared inviting, we rode down it and abandoned Jónskarð. The going was easy all the way, and at 2.30 p.m., three hours after starting, we had almost reached the south-west corner of the crater. Spencer turned his pony's head up a mountainside which a properly equipped climber would have taken seriously. We crossed ridge after ridge and by 5 p.m. reached the snow-line. When we at last surmounted the final crest it came as quite a surprise. I doubt whether on foot we could have come where the ponies had carried us. The weather and the view were both glorious. Southwards, Vatnajókull was the dominant feature; the promised land of little-known territory intervening was keenly scanned, but the interior of the crater was the more compelling. The mountain ring was made up of a jagged row of bright yellow and brick-red "shark's teeth," splashed with snow. The lake in the south-east corner, of unknown depth, was deep blue; the recent lava flows took up much of the remaining space and showed up purple in contrast to the grey-fawn banks of cinder and pumice.

Getting down into the crater was much harder than climbing up. Eventually we slithered over a terrace of dirt cones to the bottom. After an exciting lead over a brittle bad piece of recent block lava, we were relieved to strike the cinders, and 3 more miles brought us to the south-east corner of the lake, at 8.45 p.m. We had covered 25 miles.

The next day was one of geomorphology and collecting. Glennie and I scrambled down 200 feet of red laterite terraces full of gaping cracks to reach the lake, which was known as the Knebelsee after the German vulcanologist of that name was drowned there in 1907; recently the name has been changed to Askjavatn. While I was engaged on ecological work, Glennie climbed along the lake edge to examine the solfatara. That night the weather broke; there was pitch darkness for the first time since our arrival in Iceland,

and it continued to rain until 5 p.m. next day. Despite this we set off at 12.15 on August 6, and going south-eastwards were soon over the ridge of the crater. Far below us we could see the plain of the Jökulsá, with the river winding along it to the north-east, until it disappeared behind the mound of Vaðalda. Far to the west appeared the snowy dome of Kistufell, much nearer rose the shapely cone of Trolladyngja, and in front of us the imposing bulk of Kverkfjöll upreared itself, with Kverkjökull showing up cold, blue, and symmetrical in the middle. Eastwards among the tumbled crags of Kverkhnúkaranar, the twin peaks of Vítisvegur, discovered in 1932, could be clearly recognized. In the foreground, tongues of block lava, several miles long, run down into the grey of the stone desert. We had to cross two of these, mercifully narrow ones, before we were off the mountain at 2.45 p.m. The exit from the crater had been much easier than the entry, and we agreed that our decision not to use Jónskarð had been lucky. We set off again at a trot at 4 p.m. From the map we expected soon to strike a tributary flowing from north-west to south-east, and entering the main river not far west of the Svartá stream under Vaðalda, but soon found that this branch had ceased to exist. An hour later we left the stones for the smooth sand of the Jökulsá flood plain, and at 6 p.m. reached the river itself at a point where it was braided and consequently half a mile wide.

We thought fording would be easier at such a point of dispersal, but here we were disappointed. The exceptionally fine summer had caused a vastly increased melting of the Vatnajökull, and the river was much swollen. Usually horses do not need to swim. On this occasion, we proceeded for half an hour in and out of braids where the water reached our stirrup-buckles, only to encounter the main stream on the far side. The current was running fast, and though Spencer rode into it three times, each time he was swept back to the near bank much lower down. Only 40 yards away lay the smooth shingle, which continued through a gap in the Kverkhnúkaranar to Hvannalindir, visible to us green amid the black desolation, and only 7 miles off. Disheartened, we regained the north shore at 7 p.m., and having used all our reserve fodder, we had no choice but to make for the nearest grass at Herðubreiðalindir, 22 miles away.

Spencer with two horses and the map went ahead to prospect as much of the route as possible before dark. At 8 p.m. Glennie and I reached the north-west corner of Vaðalda. We noticed that the lake Dyngjuvatn, never previously recorded as being less than a mile long, was completely desiccated, a series of well-marked lake terraces alone showing where it had been; it could never have been more than a few feet deep. One horse was now showing signs of exhaustion, and we were forced to dump his load here. When we restarted, each man walked and led two horses. Directly we left Vaðalda, widely spaced flow lava succeeded the sand. This traverse had been last made by Trautz in 1912, on his way from Hrossaborg to Hvannalindir. It was good going on the whole, but the pumice formed a crust through which a hoof would break occasionally. The clouds were very low, and we thought Herðubreiðartogl was Herðubreið. At midnight we left this massif on our left, passing on our right close under a large cone, Cone 1, from which we could see the shadowy outlines of another, Cone 2, in the right direction. The yellow pumice was

now predominant over the black sand; this, combined with the darkness, made tracking very difficult, and when at 1.30 we reached Cone 2, and found the Jökulsá directly under it, the trail ceased. When next we saw the map it showed the river flowing 1 kilometre east of Cone 2 at this point. We fed the ponies with hay stuffings from the pack-saddles, and crawling inside the tent without erecting it, out of the driving sand, slept till 6 a.m.

When we started, Herðubreið itself was visible and tracking was again possible; in 3 miles we reached the Herðubreið lava flow which extends 9 miles from north to south. The surface is very rough. After two more miles we were thankful to see Spencer riding towards us, with the news that the oasis was only a mile farther on; he had reached it at 4 a.m. We arrived at 10 a.m. The ponies set to grazing; they had been 25 hours without proper food, and travelled 34 miles thus from Askja.

We remained three days at this camp to recruit and do ecological work, revisiting dry Dyngjuvatn, to collect the dumped gear, on one of them. We noticed that the old river Lindaá is now the larger one of two braids in which the Jökulsá flows for 7 miles. This fact is now known to many Icelanders, but appears to be shown on no map. Our photographed sector did not include it. On August 11 the river was rising rapidly, so we left at 8.20 a.m. We had to swim the ponies across to the east bank to avoid the lava flow. Six miles downstream where this ended, the west bank had to be regained. A 25-yard swim was necessary, and after this we rode north into driving rain. Within an hour we crossed the Grafarlondsá, and continued until we came in sight of the Hrossaborg blow-out at 6 p.m. The day's trek was 30 miles. We pitched camp among *Elymus*, which makes poor forage, and had rather a miserable night, as there was nothing to make a fire with. This tract of country is well known; earlier in this year, before the floods, Herðubreiðalindir was reached by lorry.

On August 12 we were rather glad to strike the car route and telegraph line from Grimstaðir to Mývatn, and reached the base camp at 6 p.m. We had done 26 miles, thus making a total of 165 for the round trip. The discrepancies with the map showed how changeable a river is the Jökulsá-á-fjöllum.

In some respects, the findings of the first party were rather a disappointment to those who were yet to go on an excursion. For Hvannalindir and the Kverkfjöll region were impossible, while Askja scarcely merited a second visit, and Herðubreiðalindir could not be reached by pony. We therefore decided that the Herðubreið lava flow must be covered on foot. In the light of the first excursion the food and general equipment were modified, while the question of our gear for a stay in the oasis was studied with some care. After experiment we decided that 50 lb. each for Seldon and Swann was as much as they could manage on the going they were likely to encounter. Of this 100 lb., 23 lb. was zoological gear, consisting of nets, bottles, tubes, and a tin containing chemicals in the right quantities for the estimation of *p*H and oxygen content. Botanical gear, a vasculum, and presses weighed 7 lb.

Spencer, Burton, Seldon, and Swann set off with two pack ponies, and on the first day, August 20, travelled 20 miles to Hrossarborgardalur, skirting the northern edges of Burfellshraun. The next day they rode 29 miles down to the Lindaá; the weather was perfect and the going good. The Lindaá, as they had

feared, was twice as wide as it had been a fortnight before, and they pitched camp just under the basaltic cliffs which come right down to the river.

Next day Burton and Spencer left early with the horses, and Seldon and Swann set off. They covered the 6 miles in $3\frac{3}{4}$ hours and camped in the oasis. The rest of that day, and the next two and a half, were spent in work. Meanwhile Spencer and Burton returned on their tracks, geomorphologizing more leisurely, and visiting the Dettifoss fall. They then went to Hliðarhagi and Péturskirkja, finally returning to the Lindaá, having covered a good 90 miles. About 7 p.m. both parties met again. The next morning the blizzard ceased during breakfast, and they left early in brilliant sunshine. Two of them spent one night in the minute shepherd's hut at Péturskirkja, built right in the lava at the edge of Burfellshraun, and then went only 12 miles to another hut at Hliðarhagi. The next morning they rode in sweltering heat the remaining 20 miles back to the base camp, arriving at 5 p.m. August 28. They had travelled altogether 217 miles.

Winding up an expedition at the beginning of a European war is not a pleasant experience. None of us conceived that it would be possible to carry on at home with the work on our collections, and consequently we were far from happy. We left Mývatn on September 7, and Akureyri in the *Goðafoss*, which was to have taken us home, on the 9th. From Reykjavik she dared not sail for Leith; we stayed in the town for ten days, during which a summary of our work was prepared for Rannsóknanefnd Ríkisins (the Icelandic Foreign Research Control Board). Forced to leave our heavy gear behind us in a warehouse, we ultimately left Iceland on September 21, and travelling *via* Bergen reached England on the 27th after fourteen weeks' absence. The heavy gear arrived just before Christmas.

APPENDIX I: HORSE TRANSPORT

The expedition was apparently the first of its kind to purchase Iceland ponies for its own use. Ten ponies were originally contemplated, and would have been more satisfactory than the seven to which our purse limited us. At the beginning of the season riding ponies cost about £15, pack ponies about £10. Most of the latter are perfectly rideable; where expense must be considered, one riding and seven pack ponies are preferable to our combination of three riding and four pack, and cost the same money. All should preferably be geldings; no stallions should be accepted. 40 per cent. of the purchase price can reasonably be expected on resale at the end of the season.

At the base they should live in an enclosed field, better hobbled for the first fortnight. Normally they are easy to catch, always safe to do so by the tail; when fresh, catch by driving some distance in the direction you want them. Whistling soothes them. When on trek they will stand when dismounted, if the reins are trailed. Good grazing costs 2–3 kronur a week on most farms.

If the ponies are bought newly shod, six spare ready-made shoes per head, selected sizes, should be obtained locally, and two boxes of horseshoe nails, contents 240 each. Cold shoeing is easy after a single demonstration by an Icelander, a rasp, one light, and one geological hammer being necessary. Shoeing gear must be taken on all journeys. For those unaccustomed to riding, new Icelandic saddles are required, at a cost of Kr.125 (about £5). These tend to gall riders accustomed to the forward seat, who should bring their own saddles from Eng-

land, having first seen them fitted with a D and crupper behind. New Icelandic pack-saddles should be ordered in advance; specify the type with double and not single iron crosspieces; two connected girths and a crupper must be specified, breastplates unnecessary. Proofed canvas bags, 24×15×12 inches, with strong eyes, brought from England, are convenient to hang each side of a pack-saddle; each pair must have strap and buckle to fasten under the belly. It may be well to bring all girths from England, as Icelandic girths are often shoddy. Snaffle bridles, costing about Kr.5, are preferable to the heavy Iceland curb. A good pack pony, well loaded, will carry 200 lb. 40 miles in a day on roads. 150 lb. is the maximum on a desert journey and 100 lb. is better. The wear and tear on saddlery is very great. Three reels of saddle thread, two awls, a dozen needles, and ample supplies of repair leather are essential, also say 4 lb. saddle soap, to be applied regularly. We were not so well provided and suffered in consequence.

For desert journeys, it is well worth while under peace conditions to bring 100 lb. of oats from England. Six lb. of hay and 3 lb. of oats make a good ration per head per day. Oats are best packed in small ration bags. If enough ponies are available (as they were not to us), it is desirable to take ample fodder reserves. Hay costs Kr.1 for 6 kilos. On trek, the ponies will follow a mounted leader; the other riders can whip in. Caravans tied head to tail are now illegal. Where pack ponies do not exceed the number of riders, they best led in rope snaffles. During a halt ponies are hobbled; the Icelandic hobble is made of 2 feet of plaited rope, with a 4-inch loop at one end, and a toggle made of a sheep's cannon bone spliced in at the other. This is good, but quickly wears out. It might be better to bring leather pastern-cuffs, with buckles, and steel eyes on the inside joined by 9 inches of 2-inch rope. In hobbles ponies can jump walls and canter faster than a man can run; they must be herded constantly even where there is no grazing, unless it is practicable to make a rock corral. The usual watch is three hours each. Iceland ponies cannot be lamed, but it is well to take some copper ointment in case of galls, though these seldom occur with good saddlery. Boots for desert journeys should be well nailed; there is no danger of the nails catching in the stirrup iron. Picking out hooves, and grooming with a dandybrush are worth doing if the time can be spared.

APPENDIX II: SCIENTIFIC RESULTS

Geomorphology

The geomorphology of the country traversed has been worked out in considerable detail by M. M. Spencer, now serving at sea, and the results will not be available until after the war.

Zoology. By M. M. Swann

Although the Mývatn region has been, and still is, subject to considerable volcanic activity and sudden change, there has certainly been a "midge water" there for a thousand years, for it is mentioned in the Hrafnkels saga, which relates to events of about 950 A.D. In fact there has probably been a lake there for much longer, for the surrounding contours suggest a clear lake basin. In 1723 occurred the most recent and possibly the most violent eruption round the lake. Molten lava poured out from Leirhnúkur and Krafla, and flowed into the northern part of the lake, becoming fantastically contorted in the process. The lake may well have been dried up, and various writers record, on somewhat doubtful evidence, that all life in it was extinguished. However in 1814 Henderson mentions that the flies and trout were back again, although the lake was boiling in some places; it is now nearly uniformly cold. He also

mentions the great numbers of duck nesting on the islands. If these observations are correct we have an interesting example of colonization and succession with decreasing temperature, supported by our own results.

In 1905 Ostenfeld and Wesenberg carried out a regular survey of the plankton over a period of two years; they found it to be poor in species and "lacking in any kind of phytoplankton." We made regular weekly hauls in various places and at various depths, and found an abundant phytoplankton, mainly Desmids, as well as a number of Rotifera and Entomostraca, several of them new since 1905. In addition we made oxygen, phosphate, and sulphate estimations, and determinations of *p*H and total salt concentration. The results are not yet worked out, but should yield interesting information. The water was remarkable for its alkalinity, often as much as *p*H 9·6. We took as many faunal samples as possible, and so endeavoured to produce a rough ecological map of the lake bottom. In the northern part of the lake the bottom is very rocky, corresponding with the surrounding *apalhraun*, although in places there is a thick sediment of loose mud from the morainic hills in the north and west. The average depth is 8 feet, and the fauna, though fairly rich, consists almost entirely of Simuliid and Chironomid larvae. In the south the bottom is much more level and mainly sandy, though in many places it is covered with Cladophoran "balls." The bottom fauna here contains varied insect larvae and molluscs as well.

In addition to our general survey we pickled a large number of trout and char stomachs and embedded about fifty hydroids in wax. The technique presented many difficulties in the field, including the construction of a constant-temperature water-bath. As an extension of our desert studies, we collected specimens from a number of types of plant-colonized lava. A few Coleoptera, some Collembola, and the ubiquitous harvestman, *Mitopus morio*, account for most of the species list, which can scarcely exceed thirty. The bird life of Mývatn is very rich, and we made a number of interesting observations, although the investigation of food habits was severely limited by the international duck protection move. All the duck species recorded by Lack in 1933 were seen, but scaup were far the most numerous. Black-headed gulls were common until they disappeared in the middle of July. Ravens and redshanks increased considerably in numbers towards the end of our stay. Wheatears and Iceland wrens were common round the base camp. Mice were not so abundant as we had hoped. In ten weeks' intensive trapping we managed to catch five specimens of the Iceland field mouse—*Apodemus sylvaticus grandiculus*. Mývatn must be close to the northern limit of the range of the species.

In the true desert the fauna is very poor. The harvestman is found in almost every situation, and the following birds were noticed: white wagtail, golden plover (in Askja), ptarmigan, purple sandpiper, and curlew. Askjavatn was found to be quite devoid of life. The water was sulphurous and hot in some places. The *p*H was 8·0. The Herðubreiðalindir oasis consists of a chain of little pools, about a mile long, and has formed through the stopping of a watercourse by a large lava flow. There is an interesting gradation of *p*H and temperature, from the highest to the lowest pools—a difference of about 10° C. and one *p*H unit. The land fauna bears a general resemblance to that at Mývatn, though with a few notable differences. Trout and Icelandic char were caught, as well as a single field mouse: the oasis is about 50 miles from the nearest luxuriant vegetation. Besides meadow pipit, white wagtail, dunlin, harlequin duck, arctic skua, and whooper swan, four pink-footed geese were seen and a solitary nest found. This study should provide an interesting comparison with that of Hvannalindir by Roberts and Falk in 1932. The war has rendered the working out of the results as yet impossible.

Botany. By J. A. Seldon

I. Mývatnsveit: Mývatn is on the northern edge of the central desert of Iceland, just within a 40-mile belt of the most advanced vegetation extending round the whole coast. The lake itself shows little plant zonation, due to its smooth bottom and practically constant depth. *Myriophyllum spicatum* and *M. alterniflorum* are found in vast patches alternating with *Potamogeton perfoliatus* and *Zannichellia palustris*, the latter especially with a boulder substrate. *Archangelica officinalis*, *Caltha palustris*, and *Geum rivale* thickly clothe the banks of all the islands, but the absence of *Angelica* on the shores of the lake is probably the result of the feeding habits of the ducks. Here only dirty green algal scums reach out from the land, where they coat the stalks of *Hippuris vulgaris* if the neighbouring grassland is marshy. The islands of the lake are of two types: steep ash cones with meadow grasses dominating (and often surprising amounts of *Equisetum hiemale*); flat laval boulder islands, *e.g.* Slúttnes, with damp soil seldom 4 feet above water-level. Here the vegetation is lush, *Salix* and *Betula* shrubs forming an overgrowth for nearly all the herbs to be found in the district.

On the mainland to the south of the lake, the Fram Engjar is a large *Juncus-Carex* swamp, with occasional *Salix lanata* and *S. phylicifolia* scrub. This area is cut for hay every year, with the result that the numerous ponds do not fill up with humus and the transition to good pasture is thus prevented. The north and west shores are backed by rolling heathland, *Calluna vulgaris*, *Erica cinerea*, *Betula nana*, and *Vaccinium uliginosum* being most in evidence. The soft soil of many ash craters is being rapidly eroded by wind and water. The east side of the lake is a lava field bearing a most interesting "hraun heath community." This appears to be the climax on broken lava in this area. Sheep grazing prevents *Betula pubescens* from dominating, as Hansen says it does in most parts of Iceland. Hraun heath has several co-dominants, each of which is usually locally dominant in associations, *e.g. Betula*, *Salix*, *Arctostaphylus uvaursi*, *Erica*, and *Vaccinium uliginosum*. Interesting stages of lava in process of colonization are present. Potholes and chasms opening to the water-table contain much *Alchemilla minor*, *Cerastium trigynum*, and *A. alpina*, ferns, mosses, liverworts, and green algae, often dying from want of light. The sandy desert piles up against the lava field at its eastern side, and here *Dryas octopetala*, *Arctostaphylus*, and *Elymus arenaria* try to bind the shifting black dust.

II. Herðubreiðalindir: the fine silt deposited by overflows of the glacial Lindaá, together with a copious supply of fresh water from springs, allows plant life to flourish. There are several distinct communities living at different heights above the main river and varying distances from the minor streams and ponds. All species of plant life were collected and are now being identified. As the oasis is 35 miles nearer to northern centres of distribution it will be interesting to note the presence of any species not found by Falk at Hvannalindir.

FLORENTINE WORLD-MAPS OF FRANCESCO ROSSELLI

I PLANISFERI DI FRANCESCO ROSSELLI DELL' EPOCA DELLE grandi scoperte geografiche. By Professor S. CRINÒ. *Firenze: Leo S. Olschki*, 1940. (Estratto dal vol. XLI della *Bibliofilia* diretta da Leo S. Olschki.) $11\frac{1}{2} \times 8$ *inches; 29 pages; facsimile maps*

A FIND of old maps of importance for the cartographical history of the Age of Discovery has been made in Italy by Professor S. Crinò, who has brought to light some of the lost maps of the Florentine cartographer, Francesco Rosselli. This craftsman has been known in this country chiefly as the collaborator with Giovanni Matteo Contarini in the issue of the remarkable fan-shaped map of 1506 bought by the British Museum some eighteen years ago and described at some length, with accompanying photographic reproduction on a slightly reduced scale, in the *Journal* for October 1923. (A full-size facsimile was afterwards brought out by the British Museum.)

As mentioned in the *Journal* article referred to, Rosselli had been known for some time as having produced a number of other maps, both of the world and of special countries, of which however, before the British Museum map came to light, only one was generally known: an oval world-map given in woodcut in the 1532 re-issue of Bartolomeo da li Sonetti's 'Isolario,' first brought out a good deal earlier.[1] The former existence of the rest was vouched for by the inventory of the shop of Rosselli's son Alessandro made in 1528, but nothing was known of their subsequent fate. Professor Crinò's first discovery was that of an "Atlas" owned by the Contessa Bentivoglio of Modena, described by him in 1938 at the International Geographical Congress at Amsterdam. The present brochure, dealing systematically with Rosselli's whole output of world-maps, begins with a brief description of this atlas, which consists of two finely decorated maps confronting each other—one a planisphere on an oval projection combining the old knowledge with the new discoveries of the contemporary period, the other a 'Carta da Navigare,' showing the system of loxodromes usual in such maps, but while closely resembling the other in the continental outlines, making no attempt to show the interior geography of the lands. The western (American) portion of same, like the fan-shaped map of 1506, shows two main land masses separated by the ocean surrounding the West Indian Islands—in the south the "Terra S. Crucis" of 1506 with the addition "sive mundus novus," and the extension of north-east Asia roughly in the position of Newfoundland. The oval map is a specially fine example, and, as its details are closely similar to those of the previously known woodcut, was no doubt the original from which the latter was reduced. Although signed by Rosselli, this pair of maps was not dated, but there can be little hesitation in placing it in the quite early years of the sixteenth century.

Professor Crinò has since made still more important finds, revealing not only further world-maps, but maps of particular countries, hitherto quite unknown. These last are left to be dealt with in another paper. Before describing the world-maps he summarizes what can be learnt of the activities of Francesco Rosselli, of which little was generally known when the British Museum map was described in 1923. By careful research in sources not easily accessible, added to previously existing knowledge, he is able to put together a fairly clear statement, including some details on Contarini, the other partner in the joint

[1] A slightly imperfect copy of the very rare original issue, of about 1486, was included in Lord Peckover's valuable gift to the library in 1905.

production. After spending nearly three years, 1480–82, in Hungary (of which country, as known from the later inventory, he made a map), carrying on business for Mattia Corvino, he returned to Florence, putting in order and extending the establishment for engraving maps and globes, and becoming widely known as a capable cartographer. From 1502 to 1507 he was at Venice, having, it seems, been summoned thither by Contarini to undertake the maps for a new edition of Ptolemy contemplated by the latter, and his competence is attested by contemporary Venetian writers. The fan-shaped map was no doubt meant to be the first item in the proposed edition, and was a compromise between the classical tradition and the new knowledge gained by Rosselli through the intercourse maintained by Florence with Spain and Portugal. He could not ignore this, and in the Rome Ptolemy of 1507–08 the editor Beneventano commented on his departure from Ptolemaic tradition, in particular by his rejection of the idea of the Indian Ocean as a closed basin. The new Ptolemy was however never completed, by reason of the death of its principal patron, Da Canal. The oval map given with the 'Isolario' of Bartolomeo seems to have been in Beneventano's mind in his reference to an eminent Florentine cartographer, and if so the original must have been generally known before 1507.

The story of Professor Crinò's finds is interesting as showing how lost documents may still come to light through careful search. In 1898 a German owner named Landau had exhibited a world-map, said to be by Rosselli, at the Third Italian Geographical Congress, but it had not since been seen by students. Professor Crinò was referred however by the well-known bibliographer Signor Olschki to the present custodian of the valuable Landau library, who courteously permitted a search. This revealed not only the map exhibited in 1898, but other unknown maps printed by Rosselli; and a further discovery elsewhere was that of two other special maps by him inserted in a Ptolemy MS. in the Ambrosiana at Milan. Of the Landau maps one was a printed planisphere of the Ptolemaic type (as Professor Crinò calls it), constructed on a conical projection—the second of Ptolemy—and still showing the preponderating influence of the Ptolemaic tradition: it was evidently the earliest type adopted by Rosselli. It is of special interest as in the closest agreement with the well-known map in the British Museum (often reproduced) contained in the MS. 'Isolario' of Henricus Martellus Germanus, and supposed, from a legend on the East African coast, to have been drawn not long after 1489. The Rosselli specimen is much better drawn and it is suggested that the other was merely a somewhat careless copy, though Professor Crinò also speaks of Rosselli's as an improvement ("perfezionamento"). It takes account, he says, of Vasco da Gama's first voyage to India, and thus must have been published after 1498, which date in fact appears in a legend similar to Martellus's (whose "1489," one would think, may have been merely a mistake in copying). As there is no hint of the western discoveries it can hardly have been much later than 1498, and Professor Crinò claims it as actually the earliest printed map to show the open sea-route to India. An interesting point, not brought out by the author, is the virtual identity of this map, as regards the general picture of the whole of the Old World, with the 'Orbis Typus' in the Strasbourg Ptolemy of 1573, though this gives less detail here, while adding new material elsewhere. The oval maps seem to represent the third of Rosselli's types, particularly as regards projection, the fan-shaped map taking an intermediate place. In the general picture presented the oval maps agree very closely with the Rosselli-Contarini specimen, and it is claimed that the original issue was earlier than the latter, and therefore the first to make the new western discoveries generally known. This can hardly be regarded as fully established, though quite possibly true. Rosselli seems to have

been the real originator of the oval projection once ascribed to Bordone (1528), for the latter was no expert in such matters, as is shown by his very rough sketch of the world-map for his 'Isolario,' of which the MS. is still preserved at Florence.

Professor Crinò is to be congratulated on his contribution to our knowledge of the cartography of the period in question, and the claim he makes for Rosselli as one of the leading cartographers of that time may perhaps be justified, if we think of the work of stay-at-home craftsmen rather than of the men who brought home first-hand additions from the newly discovered regions. The claim need not be merely put down as his quite natural enthusiasm for the work of a fellow countryman. The article is illustrated by reduced facsimiles of the newly found maps, with some contemporary specimens for the sake of comparison. E. H.

FACT AND FUNCTION IN ANTHROPOLOGY

ESSAYS IN POLYNESIAN ETHNOLOGY. By ROBERT W. WILLIAMSON; edited by RALPH PIDDINGTON. With an analysis of recent studies in Polynesian history by the editor. *Cambridge: University Press*, 1939. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* xlii+374 *pages; illustrations and maps.* 25*s*

ABOUT half of this volume consists of essays by the late R. W. Williamson on a number of Polynesian subjects: warfare, the drinking of Kava, the Arioi, and sex, courtship, and infanticide. The remainder of the book is mainly taken up with the editor's exposition of the correct approach, as he sees it, to Polynesian studies and the errors of ethnologists of the historical and diffusionist schools. For although Williamson's inquiries were often historical in direction, Mr. Piddington is a functionalist so extreme that it may well be doubted whether the former would have relished the setting in which his essays find themselves. It would be as well, perhaps, to make it clear at the outset that the writer of this review is among those chosen by Mr. Williamson's editor for severe individual criticism. That must not deter him from expressing his unrepentant opinion that that half of the book which is the editor's is biased, narrow-minded, and fundamentally unsound. In saying this there is no intention to underrate the very valuable contribution made to anthropological thought by Malinowski's school in stressing the importance of function. Such a contribution however does not in the least justify Mr. Piddington's claim that the anthropology of the functional school is the only kind of anthropology really worth considering. He insists that "the most important issue in anthropology to-day" is the controversy between the historical and functional schools, but if there be such a controversy it is entirely of the functionalists' making. The historical anthropologists have never denied the importance of function, and probably all of them would agree with Mr. Piddington's insistence that "the transfer of a belief or artefact or institution from one community to another always implies adaptation, incorporation and modification rather than slavish imitation." But when Mr. Piddington states that this insistence is "in opposition to the common view" he is either merely prejudiced or he is setting up ninepins to bowl them down, for one can hardly suppose him ignorant of the work of, in particular, American anthropologists. Professor Bartlett has gone further, and has made it very clear that the significance of an element of culture is often only attached to it after its

acceptance in the new community. The fact that diffusion has involved adaptation does not alter either the fact that it has taken place or that it has effected a modification of the receiving culture. And once such a modification is effected it may survive a total change of environment. Wainwright has shown that the ritual of the sky religion of ancient Egypt has survived at least three changes of religion in that country, and its functions have clearly been not a little modified. On the other hand patriarchal polygamy seems primarily associated with nomadic cattle-rearing and probably had a functional significance in that connection which has not survived the change to agriculture and industry, though the social characters of the original complex have survived.

Mr. Piddington rightly stresses the fact that an "imported" item of culture or a "borrowed" trait may be just as significant a part of the borrowing culture as one that has not been observed to be borrowed, yet he both castigates the ethnologist for, supposedly, assuming that such a trait can be ignored because it is "borrowed," and at the same time chastises him for laying emphasis on the diffusion of traits. He cannot have it both ways. The truth is that the horrid crime of the ethnologist really consists in his not being so slavish a convert to the functionalist school as to lose his sense of proportion and forget that the functional side of anthropology without the historical is like physiology would be without anatomy, and also in happening to be interested in an aspect of anthropology which clearly attracted Williamson, but which fails to attract his editor. Anthropology is something wider than a "science of human relations" as they are at the moment; if the future of those relations is within its scope, the past must be there also. But Mr. Piddington accuses historical ethnology of having "distracted attention from vital problems of sociological analysis which can be solved by empirical research." It would be every bit as true to say that historical ethnology had attracted attention to these problems; for although he clearly suggests that only anthropologists of the functional school can be properly alive to their importance, it was the historical school of ethnologists who first pointed out the practical value of the study of anthropology from the point of view of administration and of culture contacts. *Vixerunt fortes ante Agamemnona*. Sir Richard Temple, Sir Everard im Thurn, Rivers, Haddon, Rattray, to name but five, belonged none of them to the functional school.

With the appendix on Assam parallels this is no place to deal in detail. Although Mr. Piddington describes it as "yet another suggestion as to the . . . origins of Polynesian cultural elements," there was surely nothing at all novel in associating Polynesia and Madagascar with Indonesian origins. It is however satisfactory to find him citing West Africa as a place in which many close cultural parallels to Assam and to Indonesia may be found, even though he does regard an historical connection as out of the question. When these parallels attracted the writer's attention some years ago, he found that Professor Henry Balfour had already been forcibly struck by precisely the same phenomena. A reference may also be made to Lord Raglan's 'How came civilization' (London, 1939, ch. xvi, Problems of Negro Africa), while another to Lattes' 'Individuality of the blood' (London, 1932) indicates that this association extends even to blood-group distribution. Admittedly an historical connection seems *a priori* highly improbable, but its possibility, even if it cannot be regarded as established, certainly cannot, in view of the evidence, be ruled out. It is perhaps another of Mr. Piddington's inconsistencies to recognize, as he does, the validity of archaeology while apparently denying that of the study of the material culture of living peoples, which is just the same material, together with its perishable accompaniment, before it has been buried and forgotten.

He accuses ethnologists of carrying their conclusions "far beyond the point

warranted by the facts." He believes that in Polynesian culture "diffusion played a minor part," and that the "variations to be found there are due to spontaneous development from a single original culture." But the basis of this belief is far from convincingly demonstrated. Instead of facts he offers us factors: a scheme of factors of change and factors of stability. Among the former of these he does indeed include diffused traits, but he attributes to "institutional efflorescence" some important items likely to be due to diffusion, while the very nature of many of these "factors" is so vague and abstract that their effective value must be entirely unpredictable, and even if they be correctly classified as factors of change or of stability, as the case may be, it is obviously impossible to estimate the relative influence of one or of the other or to infer that their effects will correspond in any two cases. From such *imponderabilia* he aims at the "formulation of universally valid laws," and becomes every whit as hypothetical as any ethnologist he condemns, since human behaviour, as political economists have long ago discovered, rarely conforms to generalized rules of conduct.

One recalls the criticism levelled at Adolf Bastian's 'Elementargedanken,' to the effect that by insisting on the fundamental likeness of primitive man all over the world it led administrative methods away from reality to a world of theory. It is interesting and no doubt significant to find that the wheel has come full circle and that the extremists of the functional school are back once more at the point from which Tylor started, at the presumption, that is, that the human mind always working in the same way inevitably produces similar phenomena in divergent environments. That this presumption contains some element of truth few would deny; but it is no more likely to contain the whole truth than the views of the extreme diffusionist who avers that nothing could ever be invented twice and that civilization originated exclusively in one centre. "A plague on both your houses!"

J. H. HUTTON.

REVIEWS

EUROPE

POLITICAL AND STRATEGIC INTERESTS OF THE UNITED Kingdom: an outline. By a study group of the Royal Institute of International Affairs. *Oxford: University Press*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xvi+304 *pages.* 7*s* 6*d*

This series of essays, prepared for the British Commonwealth Relations Conference, Sydney, 1938, sets out clearly and frankly the fundamental considerations which govern the conduct of the foreign policy of the United Kingdom, and the strategical dispositions through which it must ultimately be enforced. Setting aside any discussion of "idealogical cleavages," the contributors concentrate upon two main themes: the balance of power in Europe and Britain's extra-European interests, largely but not exclusively commercial, including those arising from her relationship to the Dominions and the Colonial Empire. The section on European interests, tracing the course of international politics in some detail from 1919, shows British aims as they have influenced policy towards a rapidly changing situation by implication rather than by analysis; the material here is thus predominantly political, the strategical aspect being treated rather

summarily. In the later chapters, particularly those on the Mediterranean and the Near East, the interest passes to considerations of strategy. The importance of the Mediterranean route, by sea, land, and air, and the relation to it of Near East problems, is brought out clearly. The view that its significance is merely to be measured in sea miles is dispelled, and the degree to which its maintenance depends upon the good will of the Arab world is emphasized. Two final chapters discuss, with some slight repetition, the main problems of Imperial defence, particularly those of India. Within the limits imposed, this study is a helpful contribution to a balanced outlook upon vital problems confronting Great Britain to-day. Geographical considerations receive due attention throughout, but the omission of any kind of map is surprising. G. R. C.

I GATHERED NO MOSS. By JOHN GIBBONS. *London: Robert Hale*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 280 *pages; illustrations.* 12*s* 6*d*

The author describes in detail his life in a small village in the Alto Douro during an autumn and winter. He knew no Portuguese on his arrival, but his good-humoured modesty and his anxiety to understand the outlook of his neighbours enabled him to overcome the initial difficulties. With patience the reader will be able to piece together a fairly complete account of the daily life of this almost isolated community of hardworking, independent, and cheerful peasants. A few topics, described in a little more detail, might well have been elaborated even further, *e.g.* the descriptions of the olive harvest and of net-fishing on the Douro. The author is apparently more intent on setting down his own views and criticisms of various aspects of western civilization: his aim would have been achieved more effectively if his Portuguese villagers had been left to point the contrast, without his constant underlinings. His style, to one reader at least, is repellent; yet, on account of the strange vitality which pervades the book, it is worth the effort necessary to read it. G. R. C.

ECONOMICS OF PEASANT FARMING. By DOREEN WARRINER. *London: Oxford University Press*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* vi+208 *pages; illustrations and sketch-maps.* 12*s* 6*d*

DOWN RIVER. A Danubian study. By JOHN LEHMANN. *London: The Cresset Press*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* xii+291 *pages; illustrations and map.* 12*s* 6*d*

HITLER'S ROUTE TO BAGHDAD; prepared for the international research section of the Fabian Society by various authors. Introduction by LEONARD WOOLF. *London: George Allen and Unwin*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* 356 *pages; sketch-maps.* 10*s* 6*d*

A brief account of Miss Warriner's main thesis does less than justice to her detailed compact argument and the amplitude of her survey. Her book provides a real key to European problems and the facts it relates bear on any settlement which may follow the war. Western Europe, drawing upon its industrial resources, has been able to raise and protect its standard of living. In Eastern and Central Europe, with a preponderantly peasant population, the standard of living is foremost an agricultural problem, become acute through the rapid (and not entirely explained) nineteenth-century increase in population. Lacking sufficient increase in the demand for their agricultural products, the countries concerned have to choose between industrialization, which requires capital that is far to seek in lands 80 per cent. agricultural; more intensified farming, for the success of which access to the industrial markets of the West is essential; or mass emigration. The breakdown of the Habsburg Empire into highly protectionist

states robbed some of these countries of their normal outlets; their ruin was completed by the 1929–33 crisis and the raising of tariff barriers in Western Europe. While the agricultural situation, as analysed by Miss Warriner, was thus worsening, the first country actually to collapse was Austria, which falls outside her survey. Mr. Lehmann however deals sympathetically but critically with the efforts of the Austrian republic, equipped with a magnificent strategical situation, with iron, timber, and magnesite, but needing to trade manufactured goods for foodstuffs, to maintain its independence. He writes well, and conveys something of the feeling of latter-day Vienna when he describes the lighter as well as the gloomier aspects of its life. Of outstanding interest is the scattered account of the International Control of the Danube, 1856–1938: the conflict of riparian with European interests, about which information is not easily accessible.

Mr. Lehmann watched Austria disappear in the first stage of Germany's eastward expansion. The other countries he visited down river are more adequately described in the Fabian Society's survey, which seeks its unity in the threat to all states lying on the German route to Baghdad. Most substantial is the account by Barbara Ward of Yugoslavia, a country whose creditors are not her customers: a matter of import, because of her mineral resources. Politics are dealt with at some length, and with notable bias; and there are some inaccuracies (*Belgrad* for Beograd or Belgrade; *Ts*etković for *C*vetković; Mat*ć*ek for Maček; Trog*u*ir for Trog*i*r). The estimate of the Croat peasant leader Radić is of interest by comparison with that given by Miss Warriner; there was less scope in Yugoslavia than elsewhere for post-war division of land. Barbara Buckmaster gives an interesting account of Romanian minorities, of the successive stages of land reform, and of the effect on agriculture of the withdrawal of capital to foster industry. Her suggestion that Romania could honourably cede to Hungary her share of the Banat hardly accords with Miss Warriner's estimate of its agricultural value. The chapter on Bulgaria by Miss Hollingworth, on Stambuliski and the land reforms, including the development of the cooperative movement, is brightly written. Mr. Robinson's account of Greece is marred by political bias (not even a dictator could ban "the reading or the printing of the Funeral Oration *upon the death of* Pericles"), but contains a few pages on the public works programme and the scheme for the redemption of peasant debt. Miss Lilo Linke is a practised writer whose chapter on Turkish agriculture and industry suggests that Turkey has far to go before becoming involved in the problems besetting Balkan countries proper: Turkey may lack capital but has land in reserve.

The authors of this study have arbitrarily ignored Hungary, but Miss Warriner has ample occasion to deal with its anomalous position, for the half-fledged peasant revolution accompanying the last war, which elsewhere gave land to the peasants but could not supply the means to work it, did not touch Hungary; and she reckons that in Hungary, as in Romania (excepting Transylvania), reorganization of farming and markets would raise the standard of living sufficiently to solve the problem of over-population. In Poland (where, for example, in Galicia only half the families can afford to eat their own pig), Yugoslavia, and Bulgaria there are 12 millions, or one-eighth of the farming population of Eastern Europe, surplus on the starvation line, for whom intensified farming offers no remedy: their land is fit for grazing only, climate and soil are poor, and internal markets lacking. It is impossible to follow her into the details of farming in the differing regions of Eastern and Central Europe. Convinced that peasant farming is in many ways desirable and efficient, but dependent always on some industrialization or specialization (as in Bulgaria, where there

is "more gardening and grazing than agriculture in its usual sense") if the standard of living is not to be gradually forced down by over-population or the pauperization of land resources, she turns to examine Germany and Russia. She rules out as limited the help that autarkic Germany, short of capital, can offer: rising, not regulated, prices are wanted; while Russian collectivization she dismisses as incidental to a vast and private experiment in industrialization, successful only because of the virgin land available for colonization. In Russia, as in Bulgaria, organization has increased yield without so far appreciably affecting standards of living. A European Customs Union might rehabilitate Eastern Europe, which "in the economic history of the nineteenth century . . . did not amount to more than a footnote"; it would however lower not only food prices but the standard of living in Western Europe, while the rising population in Eastern Europe (on the assumption that one family must produce enough to feed three families if it is to live adequately) would still demand an outlet that only emigration could supply. A Federated Europe could thus only be a first stage in any post-war reconstruction. J. P. H. M.

THE ARCHAEOLOGY OF CRETE: an introduction. By J. D. S. PENDLEBURY. *London: Methuen and Co.*, 1939. 9×5½ *inches;* xxxii+400 *pages and* xliii *plates; illustrations, location-maps, and plans.* 30*s*

This book consists of over 400 pages, closely, sometimes too closely, packed with information, and 43 plates, likewise rather congested. Prehistorians will welcome a clear and well-documented exposition of Minoan Crete, pp. 35–302, though the general reader, despite a few lighter touches, may find it somewhat austere reading. In describing post-Minoan Crete Mr. Pendlebury has set himself too hard a task. It would require a rare mastery to compress an adequate account of such an important period as Archaic Crete into twelve pages. Here as elsewhere the Bibliography is a useful contribution to knowledge.

The readers of this *Journal* will however be more interested in pp. xxiv–xxxii, 1–34, which deal with more general topics. First transliteration: the reviewer pleads for consistency whatever the system. In a learned book letter for letter transliteration might well have been adopted, though in Crete a strict phonetic rendering should produce interesting forms. For instance Arkalokhōri looks pretty written Arčalokordjo. To adopt a partially phonetic rendering and apply it partially is difficult: how would one guess the original Greek or the pronunciation of Lebena, Leuke, Klauda Araden (map 23, p. 366)? Rethymnon, not Rethymnos, is the official form on the latest Greek charts.

Mr. Pendlebury is at his best speeding across the Cretan mountains, though travellers in Crete must be warned that they will require tight belts to keep up with him. His description of routes (pp. 7–16) merits close attention. Once his pen ran away with him, and he called Crete one of the most barren islands of the Mediterranean (p. 6), forgetting all the stony Cyclades, and all but one of the Ionian Islands. As his book is called an introduction, a fitting penance would be a palinode, describing the riches that he so lightly denied, in a slimmer volume that would fit into a knapsack. Mr. Pendlebury could tell us more of the mountain cornlands, found even on the dry eastern downlands, and of the astonishing waters of Zakro that gush out below them; of bananas, oranges, and windmills; where mulberries grow, what silk is spun from them, and what liquors are brewed from them; of vines and grapes and wines: who could tell us better? At the end there must be fewer, clearer, larger photographs to do justice to the landscape of Crete. S. B.

ASIA

SHEBA'S DAUGHTERS: being a record of travel in southern Arabia. By H. StJ. B. PHILBY; with an appendix on the rock inscriptions, by A. F. L. BEESTON. *London: Methuen and Co.*, 1939. 9½×6½ *inches;* xx+486 *pages; illustrations and map.* 21*s*

So much has been said upon the more controversial side of this book that its main value and interest have been threatened with neglect. It contains the record of an exploration of such value and extent that it should rank with the greatest of contributions to geographical knowledge. A few years ago it was said that with Bertram Thomas' and Philby's crossings of the Great Southern Desert, the Rub-'al-Khali, the word *finis* had been written to land exploration. But there still existed an area of some 200,000 square miles of virgin ground, untouched and unseen by Western eye. Instead of being an Empty Quarter, this region concealed more of human interest than perhaps did any other portion of the Arabian Peninsula, for it was the seat of an ancient civilization, the highway of the earliest trade routes, while the site of Shabwa lay secret within its boundaries. Hogarth had already pointed to that particular corner of unexplored Arabia as the one most deserving a visit: in Najran and the Yemen hinterland there would be discovery well worth a risk. But for thirty years no one was able or willing to take the risk. Philby doubtless had exceptional opportunities, but he has made good use of them. His scientific work ranks high: laborious in execution, as only Arabian travellers can appreciate, and perfect in detail, as any one who reads can realize. He has completely altered our largely imaginary idea of what that corner of Arabia is like. Before his visit the hydrography of this region was entirely theoretical; now a very large part of it has proved to be very different from the theory. Of its settlements, their wide areas of cultivation, and the remains of their antiquity this is the first reliable witness. It still awaits detailed exploration by qualified archaeologists. D. C.

L'AFGHANISTAN. By RENÉ DOLLOT. *Paris: Payot*, 1937. 9×5½ *inches;* 318 *pages; illustrations and map.* 40 *fr.*

Since Alexander's armies crossed the Oxus and the Hindu Kush on their way to India in the fourth century B.C., Afghanistan has often been the meeting ground of the civilizations of Asia. There is perhaps no part of Asia where so much unwritten history lies buried among its ancient remains, in its historical traditions, its customs, and folklore. When, in 1922, a number of diplomatic missions, accompanied by the French Archaeological Delegation, were established in Kabul, they entered a country which had been practically closed to European travellers and scholars for nearly a century. The time has not yet arrived therefore for the publication of a comprehensive work of scholarship on the geography, history, and races of Afghanistan. Much of what we know has still to be gleaned from the pioneers of a hundred years ago, Masson, Burnes, and Ferrier, or the observations of members of the Boundary Commission, such as Yate and Holdich, who crossed the country towards the end of last century.

M. René Dollot was French Minister at Kabul for nearly two years, from 1934 until 1936, and he has written a pleasant description of the parts of the country which he visited during his stay in Afghanistan, and of the life of the small community of foreign diplomats who reside beyond the Khyber pass. His narrative is interspersed with a good deal of historical anecdote and tradition, and the general history of the country is lightly touched upon in an introductory chapter. Some interesting material, not easily accessible elsewhere, is to be found in his account of modern Afghan customs and popular beliefs, illustrated

by translations of a number of Afghan poems. Finally, there is an authoritative summary of the achievements of the French archaeological mission which has made such a distinguished contribution to the study of the ancient civilizations of the Indian Frontier and Central Asia. M. Dollot has in fact written an attractive travel book, for he knows how to paint a vivid picture of what he sees. For this reason, if for no other, it is a pity that his journeys did not take him off the main roads into those more inaccessible parts of the country which have not yet been wholly explored, such as the Hazarajat, Seistan, Herat, Kafiristan, or Badakhshan; for Kabul, Kandahar, Bamiyan, and Balkh have been described before (indeed by at least four writers in the last few years). But what he has done, M. Dollot has done well and with a fresh touch and in a manner which is always easy, and often a pleasure to read. The solitary sketch-map and the absence of an index do little credit to the publisher of a series entitled 'Bibliothèque Géographique' of which this book is a volume. E. B.

A SCIENTIST IN TARTARY: from the Hoang-ho to the Indus. By WILHELM FILCHNER. Translated by E. O. LORIMER. *London: Faber and Faber*, 1939. 9×5½ *inches; 392 pages; illustrations and map.* 21*s*

Dr. Filchner has here given us an excellent general account of his latest journey. We know with what meticulous care he works, and must assume that in carrying out this new astronomical and magnetic traverse he followed the same processes as on his previous expedition; this might usefully have been explained and emphasized, for he has made a very great contribution to the mapping of Tibet. His preparations were thorough and unhurried. On his previous journeys he had cooperated with the Survey of India in Dehra Dun, and again he spent a month there on his way out to China. His first care on reaching India more than three years later was to go back to Dehra Dun with the results of his work.

The careful carriage of delicate instruments under incredibly difficult conditions was one of his chief anxieties. In spite of his having received an appointment from the Chinese Government to carry out scientific observations for them in Sinkiang, this was no easy task. To begin with, his instruments had to be sent for repairs all the way back to Berlin from Shanghai, a matter of three months; and the fearful explosion of the munitions dump at Lanchow, which is well described from an uncomfortably close position, again damaged them, but on this occasion they were put right in Shanghai, sent and returned by air.

The author was fortunate to pick up companions who knew local conditions and languages. The first was a German missionary, Brother Gervasius, who accompanied him right through to India. Another was a pathetic White Russian exile, an ex-cavalry officer named Borodijin, who would have liked to escape from Central Asia, but who eventually turned back for fear of coming into contact with dangerous Soviet influences. Early mutinies among his caravan drivers were with difficulty overcome by the help of the local Chinese and Mongolian authorities.

After nearly six months of travel through uncultivated waste the party reached Cherchen, where the very modest comforts found seemed wonderful. Their real troubles were at Khotan. On arrival they visited General Ma-Hushan, "the King," who after preliminary politenesses took exception to the fact that they had no visa for the province of Sinkiang. They were ordered to return the way they had come, a winter journey of 1250 miles impossible for men physically and financially exhausted. They were detained in great discomfort. The British Consul-General from Kashgar, Major Packman, visited Khotan at this time, and the unhappy men were counting on his being able to put an end to their intolerable position. With difficulty an interview was arranged, but little

could be done immediately, though steps were initiated to help them. Their despair and depression were intensified when the Consul-General was obliged to leave without being able to see them again. Finally, after seven months of this heartbreaking captivity, they were allowed to make their way on to India on conditions. They had further trouble with their caravan people, and it was not until they got into touch with the Kashmir officials in Ladak that their troubles were really past. One cannot help wondering whether their continuous difficulties with caravans, Chinese, Mongolian, or Ladaki, were not in some way due to the travellers themselves. Crossing the Karakoram pass, the Depsang plain, and the Sasir pass, they reached Panamik, where their pleasure in meeting the first sign of a competent administration, in the form of a humble chaprassi from Leh, is significant. The story is rounded off by the meeting with the German Consul-General, Count von Podowils-Durnitz, and the announcement that Dr. Filchner had been awarded the German national prize.

The translation is good. There are good pictures, but it is annoying to have them placed up to a hundred pages away from the description of them. There is a good, clear outline map.

Some readers will miss more notes on the natural history of this very interesting country; but it is intriguing to wonder what small yellow wild oxen on the eastern borders of the Tsaidam marshes can have been, and if "Kalati Cocks" can be sandgrouse. F. M. B.

AFRICA

FOURTH SHORE: Italy's mass colonization of Libya. By MARTIN MOORE. *London: George Routledge and Sons*, 1940. 9×5½ *inches;* 234 *pages; illustrations.* 12*s* 6*d*

A DATE IN THE DESERT. By G. L. STEER. *London: Hodder and Stoughton*, 1939. 9×6 *inches;* 256 *pages; illustrations and sketch-maps.* 15*s*

These two books to some extent cover the same ground, but they differ completely in treatment and in point of view. Mr. Moore's account is confined to Libya and is the more objective; Mr. Steer's is much more personal, in places almost embarrassingly so: his journey included Tunis as well as Libya.

Mr. Steer shows vividly the contrast between the French and the Italian methods: it goes very deep and arises from the wholly different purpose underlying colonization in the two countries. France took possession of Tunis in 1881 and was encouraged to do so by Bismarck. Enormous olive plantations were laid out and the vast deposits of phosphate and of iron ore were developed: in 1938 Tunisia's foreign trade was valued at some £17,000,000. Large numbers of Italian settlers especially from Sicily have come in; Mr. Steer found them prosperous and contented. The Arabs also are well satisfied. Their principal grievances are said to be the extensive bureaucracy and the inequality of entrance into the Civil Service, where even the humblest posts are held by Frenchmen. But Mr. Steer found no desire to break away from France, instead a considerable affection for France, a colonial army able and willing to maintain the *status quo*, and a recognition that Tunisia could not survive as an independent country. The French adopt a sympathetic attitude towards Tunis; the cultivators produce what they like; they started with wine for their own needs and now produce so much that they export to France and glut the market there. The French Government, unwilling to exclude the wine, pays the Tunisian vine growers to grow something else instead. The French have not greatly developed the underground water supplies or set up large irrigation works.

The Italian colonization has been on entirely different lines. Its objects are

clearly set out by Mr. Moore. First an outlet was needed for the rising population, one of the fastest-growing in Europe and deliberately stimulated by financial inducements more thoroughly applied than anywhere else excepting Germany. But as the total planned colonization is only for another 100,000, and as the annual increase in Italy even at present is 400,000, it is clear that the population factor is only of minor importance. Secondly, Libya was to help in the policy of self-sufficiency officially adopted for Italy. It may supplement but not compete with Italian agriculture and industry: no problem like that of Tunisian wine can ever arise. Olives and wheat are both in demand in Italy and can therefore be produced; in addition the colonists are to be self-supporting. The third reason for the colonization is strategical, and this Mr. Steer discusses at considerable length.

The remarkable results achieved by the mass colonization of Libya are described by Mr. Moore. It differs from all previous colonizations in that it was planned beforehand down to the last detail. The villages and farmhouses were all built and the farms laid out before the colonists arrived: they were then brought out *en masse*, and delivered to homes which they found complete, with the furniture in place, stores of food in the cupboard; where necessary the first crops had already been sown. Furthermore the colonists were carefully selected. They had to be of peasant stock, good cultivators of the land, healthy, numerous in family, and staunch Fascists. There was no confusion of migration with unemployment or social distress: only good workers of unexceptional character were accepted.

The transport of the migrants from Italy to Libya will always rank as one of the most dramatic journeys on record. Mr. Moore's description of it is both accurate and vivid. On arrival the colonists found everything ready for them: there was no disheartening empty house or shack settlement, but attractive small towns with school, church, and public buildings complete. The farming is entirely under the supervision of the colonizing organization, a veiled form of Government activity. For the first year the colonist is paid a wage for working his farm; then he becomes a partner, receiving half the produce of the farm, which however the organization sells for him. Finally it is intended that he should become full owner of the land; but he must pay for it. It is hoped that the colonists will be clear of debt in twenty-five or thirty years. The organizations spent about £3,000,000 in establishing the 1800 farms of the 1938 scheme in addition to great Government expenditure. By 1942, when 100,000 colonists and children will have been transported, the expenditure is estimated to reach £20,000,000. Neither author supposes that the money can be fully repaid, but this is not the aim. There seems no reason to doubt the success of the scheme so long as the water lasts and Italy continues to supply the men and the money.

Both books are of interest not only to geographers but also to students of social affairs. We have spent great sums in the last twenty years on land settlement at home and overseas, and comparison with our schemes is inevitable but not easy. The purpose and the human material were very different; we were dealing with unemployment and social regeneration, the Italians were not. Their colonists are admirable settlers: they have demonstrated in Queensland and elsewhere how well they can succeed where some others fail. Further, the Italian method allows complete control and absolute accordance with the plan. The colonists are not free to leave their farms for other work, nor are their children unless permission is first obtained; they must produce in accordance with instructions: even a cow cannot be sold without permission. The colonist is protected by the State against economic forces, but in return he must accept

discipline. This is a problem for which the democratic countries still have to find a solution. E. J. R.

SEARCHLIGHT ON GERMAN AFRICA: the diaries and papers of Dr. W. Ch. Regendanz. A study of colonial ambitions. By F. W. Pick. *London: George Allen and Unwin*, 1939. 7½×5 *inches;* xiv+178 *pages; illustration and sketch-maps.* 5*s*

Dr. Pick's monograph, based on the hitherto unknown diaries of a former German subject, is a valuable contribution to the recent history of some parts of Africa. It supersedes much of what has been published on the Agadir Crisis of 1911, and draws attention to a part of Africa which writers have neglected, namely Nyassaland (the northern part of Portuguese Mozambique, not to be confused with Nyasa, the British dependency, south-west of Lake Nyasa).

The driving force behind the German moves in Morocco was, we learn, not so much the firm of Mannesmann, as a group of Hamburg merchants who had the backing of the German Foreign Office. There were various reasons for Germany's withdrawal from the Moroccan scene, but, as Dr. Regendanz's diaries show, the decisive one was that the ore mines proved to be less rich than had been supposed. The report on the possibilities of a European type of agriculture in South Morocco was also pessimistic.

The author complains that Lord Hailey in his 'African Survey' hardly refers to Nyassaland (*Port.* Niassa). So little has been published about this territory that it is to be regretted that the author has not given us more details from the three-volume survey made by Dr. Regendanz and printed privately in 1918. Dr. Regendanz's attempts, stretching over many years, to secure Nyassaland, which up to 1933 belonged to a chartered company, for Germany is most interestingly told and throws new light on German post-war colonial ambitions. It may be doubted though whether the object was worth the effort; Mr. Robert R. Walls, writing in the *Scottish Geographical Magazine* (1922) on Portuguese Nyassaland, thought that the resources of the territory are rather potential than actual. He concluded that it could be properly developed, but only by "a wealthy, benevolent power." Whether Germany would fall under such a definition is another question; but Dr. Regendanz's efforts were finally frustrated by the German Foreign Office itself, which did not think the time (1929) opportune to back the attempt. G. M. F.

NORTH AMERICA

THE PHYSIOGRAPHIC PROVINCES OF NORTH AMERICA. By Wallace W. Atwood. *Boston, etc.: Ginn and Co.*, 1940. 9½×6½ *inches;* xvi+536 *pages; illustrations, map, and map in pocket.* 25*s*

"Any large land area must be subdivided if detailed geographic studies are to be undertaken. When human use of the land is accepted as the basis for subdividing land areas, the possibilities become extremely varied. Each plan has certain advantages and certain definite weaknesses. . . . The simplest and most generally useful subdivision of a land area into geographic regions is based upon contrasts in topography or relief. The existence of mountains, plains, plateaus, and uplands cannot be questioned. Their influence upon living conditions and upon the occupations of most of the people has been persistent, sometimes profound, and at all times essentially unavoidable." In these words Dr. W. W. Atwood adheres to an approach to the subject which has recently been challenged. The physiographic provinces of the United States have been made familiar by the early work of J. W. Powell, by I. Bowman in his 'Forest physiography,' through the great volumes of N. M. Fenneman, and the well-

known diagrams of A. K. Lobeck. Now Atwood has prepared for the student and the general reader a simply written account, magnificently and freshly illustrated, whose novel features will be appreciated. After referring briefly to other schemes of regional division, each major physiographic province is taken in turn and its features analysed with the help of new sections, block diagrams, and photographs. Many of the latter are aerial views by Dr. Barnum Brown, who clearly knows what to photograph and from what angles the essential features can best be seen. Dr. E. Raisz has prepared the block diagrams and also a folding map of the land forms of the United States. In its detail and technical skill, the latter is a great advance on previous physiographic diagrams, since it uses carefully standardized symbols for each type of land form. In the regional descriptions, physiographic and geological terms are introduced incidentally and explained, whilst special attention is paid to the development of the topography so that the book serves also as a text-book of physiography. At the end of each section a few brief indications suggest the "approach to the human drama," and there is a selected bibliography and a list of topographic sheets for detailed study. L. D. S.

CENTRAL AND SOUTH AMERICA

A UNICORN IN THE BAHAMAS. By ROSITA FORBES. *London: Herbert Jenkins*, 1939. $8\frac{1}{2}\times5\frac{1}{2}$ *inches; 244 pages; illustrations and end-paper sketch-maps.* 10*s* 6*d*

As the authoress suggests, Columbus's faith in the cartography of Toscanelli is shared by every traveller who gazes at a new map, beguiled by the ease with which the cartographer eliminates distance. For herself, with a new map spread before her, "all seas are calm, all rivers fordable, and all mountains provided with suitable passes. There are wells in every desert and every goat-track is a *route nationale*." For eighteen years, she tells us, she had been waiting for a chance to travel without any purpose at all, or with one so fantastic that the purpose was of no moment; and eventually circumstances offered her a voyage to the Bahamas. Fortunately realization exceeded anticipation: life is not always so kind to travellers as it was to her. She appears to have enjoyed everything she saw in the islands; indeed her enthusiasm tends to make her uncritical, shrewd observer though she is. After an historical survey (less valuable because the information she gives is easily accessible elsewhere) covering piracy, slavery, the early settlements, and blockade running, she describes her own experiences. No one could visit all the islands, for there are three thousand of them, but she saw many, including San Salvador, the landfall of Columbus; Andros, the home of the flamingoes; South Bimini, where legend has it that Ponce de Leon found the elixir of eternal youth; Cat Cay, where an American keeps a club which is "the whole alphabet of comfort"; Little Exuma, with its traces of great houses and the slave days; and Spanish Wells, occupied by descendants of the loyal settlers from the American Colonies, still insistently British; and Eleuthera, the island of William Sale and his Company of Adventurers, where the authoress finally elected to build a house herself. She discusses the future of the islands and comes to the conclusion that "they may prove to be a Western Heligoland, guardian or gaoler of the Atlantic." O. R.

THIS WAY SOUTHWARD: the account of a journey through Patagonia and Tierra del Fuego. By A. F. TSCHIFFELY. *London: William Heinemann*, 1940. $8\frac{1}{2}\times5\frac{1}{2}$ *inches;* xvi+354 *pages; illustrations and sketch-maps.* 15*s*

Mr. Tchiffeley's journey south to Patagonia was not, like his previous one from Buenos Aires to New York, made on horseback, although the presence of wood,

grass, and water, hospitable stockfarms and other halts, to-day make this mode of travel through the southern extremity of South America a comparatively simple matter. The country and climate is roughly comparable to that east of the Rockies from the United States border as far as the Peace river in Northern Alberta. Long distances however and the limits of a single summer season led the author to rely, in the place of horseflesh, upon a Ford car, which he supplemented by a short aeroplane trip when crossing the Straits of Magellan. The outward route followed the Atlantic coast, returning along the Andean foothills, with occasional excursions into their more settled valleys.

Stories and legends of early Patagonia, with notes on the vanished or vanishing Indian tribes of Patagonia and Tierra del Fuego, form an incidental background, but one which may be studied better and in more detail elsewhere. One dramatic episode of many recounted is the author's chance meeting with the Indian family who had bred his four-footed friends, Mancha and Gato, as proved by the register of the "mark" or brand upon their flanks. The real value of the book lies in its straightforward presentation of a 7000-mile motor trip in 1939 through a district whose development, though slow, is made certain by its pastoral and even by its mining possibilities, and which is remarkable for its beauty and for its immunity from world politics. W. S. B.

AUSTRALASIA AND PACIFIC

SOME AUSTRALIANS TAKE STOCK. Edited by J. C. G. KEVIN. *London: Longmans, Green and Co.*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches;* x+240 *pages; maps.* 10*s* 6*d*

This book does not contain a comprehensive treatment of all Australian affairs. It is in fact little more than a collection of articles, for the chapters are connected only through their theme and the writers being Australian. The contributors disclaim responsibility for the opinions expressed by one another, and none of them discusses the White Australia policy though some evidently realize that it materially affects what they say. But these seeming defects add value to the contents of the book, which will well repay reading.

The following synopsis of conclusions reached by the writers, chapter by chapter, gives an idea of the nature and interest of the contents. The extinction of the aborigines is not inevitable. The influence of convictism on the evolution of Australia was episodic. Griffith Taylor's estimate of an eventual maximum population of 20,000,000 may be accepted. The Australian accent may in part be produced by a species of national sloth induced by the climate. The present trends of politics in Australia are not very hopeful and the machinery of government needs overhauling. Australia could promote prosperity in the East, raise her own standard of living, and expand her exports by following a different trade policy. The exodus of talent is in part due to the insistence on uniformity which is typical of the philosophy pervading the whole social fabric of the country, and to avoid it there must be a willingness to compete in the open market for brains and ability. A foreign policy is needed and should decide which Continental issues are vital. A generous attitude towards refugees of a certain type would accord with Australia's economic interests, as other people do not want to enter the country and there is still an unimpaired case against further agricultural expansion by large-scale migration.

Perhaps the most interesting chapter for the geographer is that by Clunies Ross on the factors limiting settlement. It includes a summary of the 'Report on the land and land industries of the Northern Territory,' 1937, which described conditions in the area so clearly, but erroneously affirmed that

development and settlement there could be accelerated by grazing certain parts with sheep and building an uneconomic isolated railway from Wyndham. It is a pity the chapter does not refer to the destruction of forest, bush, and other vegetation, or the misuse of land and soil, all over Australia, and the effect this must have upon the humidity of the atmosphere and future settlement. This chapter ought to be read by the many people who, as Professor Fisher says in the book, "have taken far more seriously than the facts ever warranted the boastful utterances of those who bitterly resented the efforts of scientists to present a fair and accurate picture of [Australia] poorly equipped in natural resources, as it undoubtedly is. . . . There is still a certain reluctance in many quarters to allow the critical spirit to run its full course." S. U.

WALTZING MATILDA: a background to Australia. By ARNOLD L. HASKELL. *London: A. and C. Black*, 1940. 9×5½ *inches;* xxiv+296 *pages; illustrations.* 12*s* 6*d*

A few years ago Dr. Thomas Wood, in 'Cobbers,' gave a delightful description of Australia; this is another book of the same quality. The two are complementary in that while Dr. Wood sought and enjoyed the open spaces, Mr. Haskell found himself most at home in the cities. Both writers can be personal without becoming egotistic. Mr. Haskell might have used for his title a phrase from his last chapter, "Falling in love with a Continent," for that is precisely what he did, and he describes the process in the most engaging way. The only place in which he loses his gift of clear writing is in the same last chapter, where his comparative incoherence is the more revealing. The author has become a serious student of Australian history and he uses a new and attractive technique, pointing out the contrasts and illustrating history by extracts from the past in dramatic setting, his leaning being towards the picturesque rogues of the past rather than the politicians. His apologia for the Kelly Gang of bush-rangers is perhaps less happy than his vigorous defence of Governor Bligh, with which the unbiased historian will agree. Even more fresh and welcome is his review of Australian art, especially pictorial art. Though shrewdly critical and able to lay about him when he wishes, he sees in this young growth elements of great hope, and his appreciation of the Australian outlook is nowhere more marked. F. D.

POLAR REGIONS

SOVIETS IN THE ARCTIC. By T. A. TARACOUZIO. *New York (and London): The Macmillan Co.*, 1938. 9½×6 *inches;* xiv+564 *pages and* 7 *maps.* 32*s* 6*d*

Very few books on Soviet Russia present the social and economic developments of that country in a more or less objective manner. Mr. Taracouzio's book is one of these rare exceptions.

With the aid of the Bureau of International Research, Harvard University, and Radcliffe College, the author has undertaken a complete study of Soviet Russia's advance into the Arctic. He starts with the geography of the Russian Arctic; and gives an account of explorations before 1917 and after, up to Chkalov's flight in June 1937. Two of his chapters, which comprise the bulk of the book, deal with recent economic developments in the Arctic and social-cultural reconstruction in the Far North. The author concludes his study with a discussion of the international significance of the discoveries beyond lat. 61° N. His maps, numerous appendices, and a wide bibliography are valuable sources of information for every student of the Russian Arctic.

There is a certain lack of proportion in Mr. Taracouzio's treatment of past

and present Arctic explorations. Thirty pages only are devoted to work prior to 1917, and over three hundred to exploration since the Russian Revolution of 1917. It seems too that he has been so impressed by the mass of decrees and optimistic records contained in Soviet publications that the actual achievements in the sphere of economic development are somewhat overshadowed by them, and it is difficult to grasp their actual extent and their value. Briefly they consist of the following developments: A regular service between the European coast of the U.S.S.R. and the mouth of the Ob' and the Yenisei rivers in western Siberia was established as early as 1920, but in spite of that only four ships in 1935 and only fourteen in 1936 (Professor Schmidt's report) made the through passage. Seven new ports are now nominally established in addition to Archangel and Murmansk, but only three of them—Igarka on the Yenisei, Tiksi on the Lena, and Dickson Island (a coal base)—are functioning; the others are still being planned. Freights carried on the Siberian rivers, in the Krasnoyarsk, Yakutsk, and Omsk districts, totalled 157,400 tons in 1936. The problem of transport by draft animals (dogs and deer) is still far from being solved. Ten air lines, with a total length of 11,395 kilometres, are now operating, and in 1936 polar aircraft had completed 12,900 hours of flying and had covered a distance of 2,238,000 kilometres, carrying 5400 passengers and 900 tons of cargo (Professor Schmidt's report).

According to Mr. Taracouzio, the industrial achievement may appear negligible at present, but the progress is strikingly different from what it was in pre-revolutionary Russia: "It is true that to-day's production is not only ridiculously small as compared with the figures of the plan, but far below the actual local demand. . . . The progress in hunting has been rather slow under the Soviets. . . . Qualitatively the products of the Fur industry are also deficient. . . . But there is no doubt that new impetus has been given by the Soviets . . . which ensures a much brighter outlook for the future." "In regard to the fishing (Professor Schmidt's report) the situation is serious. Here we have failed in mastering the situation." Industrial exploitation of sea animals (except in the western section of the Arctic) remains in the stage of investigation.

As to progress made in agriculture in the Arctic region under the Soviet regime, "the possibility of the development of agriculture beyond the arctic circle is proved, the principle of selectivity introduced and a ratio between the relative importance of farming and live stock raising established. But the actual results in terms of hectares, quintals and heads are negligible and the agriculture in the Arctic is still in its infancy."

The author gives a detailed account of the controversy over jurisdiction in the Arctic, and the sector principle. The Communist conception of the Polar sector principle is, in his view, identical with the non-Communist conception, but the Russians have raised several problems which jeopardize the principles of international law. An international conference is urgently required to modify the sector principle so as to avoid conflicts on the question of the freedom of the seas and of the air.

Mr. Taracouzio speaks very highly of the international significance of Soviet activities in the Arctic; he admires the "unprecedented magnitude" of the Soviet plans for the conquest of the Arctic and insists that the international value of the work of the Soviet scientists must be appreciated. In dealing with the shortcomings and drawbacks of the New Deal in the Arctic, he quotes Professor Schmidt's report, which in a few words summarizes their actual causes:

"It must be admitted that (even) the brilliant achievements of individual comrades . . . can never take the place of organization; yet it is (precisely) this (latter) which is very weak, not only in (the working of) our air lines, but also at

the ground bases as well." Mr. Taracouzio thinks that "to-day, Soviet penetration into the Frozen North is no longer a thing so extraordinary in the U.S.S.R. as to call for front-page publicity in Moscow newspapers . . . the conquest of the Arctic in the Soviet Union has become a matter of routine." He will have been interested to hear that the recent drift of the *Sedov*, the ice-breaker, received very wide publicity in the Russian press and wireless, and for many weeks was used to raise the enthusiasm of the people. S. P. T.

PHYSICAL AND BIOLOGICAL GEOGRAPHY

OUR WANDERING CONTINENTS: an hypothesis of continental drifting. By ALEX. L. DU TOIT. *Edinburgh and London: Oliver and Boyd*, 1937. 9×5½ *inches;* xiv+366 *pages; maps and diagrams.* 18*s*

Until about twenty years ago it was generally taught that, in thinking out a general history of the Earth's surface, a choice must be made between the basic ideas of the permanence or impermanence of continents and oceans. The names of Wallace and Geikie were associated with the former, those of Suess and Blanford with the latter doctrine. Then Wegener burst in with his theory of continental drift, which made continents permanent as blocks but impermanent in position. But Wegener was not the originator of this theory: apart from earlier and rather fanciful suggestions, Pickering had the credit of formulating a scientific theory of continental drift in 1907. Baker also put it forward in 1910, but it was Wegener who drew general attention to it. Very hostile at first, geological opinion has gradually come to view the theory with greater favour, though the many difficulties make most geologists incline to a verdict of "Not Proven."

Dr. Du Toit, impressed by his personal observation of the geological concordance between Africa and South America, has devoted himself to a very thorough study of the whole question, and is now a convinced advocate of the general theory of drift, differing in matters of detail from Wegener. On pp. 51–53 he briefly summarizes twenty-five criteria or lines of evidence for continental drift, developed in detail in the rest of the work. Rather surprisingly, he omits one fact of great importance: the secular change in the Earth's magnetic constants, which points definitely to the existence of a flow in the deeper, iron-rich Sima, a necessary condition of horizontal movement in the lighter Sial continents floating on it. The only allusion to this matter is a single sentence at the top of p. 322, not considered worth a place in the index.

The mass of detailed evidence brought forward is impressive. For some of the facts other explanations can certainly be found, but it is difficult to explain the close similarities in the geological histories of the southern continents without assuming that they were once in contact. Once this very big fact is admitted, the many confirmatory evidences fall into place.

Undoubtedly there are difficulties facing the theory, and Dr. Du Toit might now set to work to deal with these. There are, for instance, the facts of distribution of land-snails in the Pacific Islands, from which Pilsbry deduces a former Pacific continent: can his theory be modified in harmony with the Drift theory? The admission that continents may drift does not necessarily involve a denial that they may be submerged. There is ample geological evidence of faults with downthrow of many thousand feet, and Fermor's infra-plutonic zone (which Du Toit prefers to call the paramorphic zone) offers a possible physical explanation of such downfalls not inconsistent with isostasy.

Meanwhile, whatever other movements may be made by continents or their

fragments, lateral movements can hardly be disputed in face of the evidence in this book. Dr. Du Toit is to be congratulated on a work of great value.

A. M. D.

CARTOGRAPHY

MILITARY MAP-READING FOR THE NEW ARMY, with an appendix on judgment of distance. By W. STANLEY LEWIS and F. W. MORGAN. *Exeter: A. Wheaton and Co.*, 1940. $6\frac{1}{2} \times 5$ *inches; 64 pages; diagrams.* 1*s* 6*d*

The ordinary student of map-reading finds it a hard subject because he is not used to thinking in terms of three dimensions. What recommends a short, unofficial manual to him is therefore clear, simple, and accurate language and an easy but coherent development of explanation. Captain Lewis and Mr. Morgan have not produced a commendable text-book. On the opening page they say that "it should be the aim of all map readers to acquire the art of sketching accurately, in three dimensions, the topography of the ground which, on the map, is represented in two dimensions." Whatever this means, it will not help to dispel the commonest misconception of the ordinary student: that he has to learn to imagine actual scenery through looking at maps. The language of this book is often obscure or inaccurate and is sometimes ungrammatical. We are told on p. 6 that "a map is only a plan of the ground under survey," and on p. 10 we hear of "the relation of measurements between points upon the map to the equivalent distances on the ground." P. 14 mentions "the nearest second place of decimals," and p. 41 "the lubber line, which is zero." There are some serious misprints. "Scale 1/63/360" appears on the diagram on p. 11 and we are referred to (A) and B of Fig. 6 on which the letters do not appear. There is no comfortable relation between the parts of the book and no discrimination between the common map-reading problems of different formations and arms of the Services. The book is obviously meant for use in North-West Europe, but its tables of conventional signs used on French and German maps are faultily reproduced. On the former *Chemin d'exploitation* is rendered by *Commercial road* and such misprints as (*Limite*) *dé Departements* appear. On the latter *Holzbrücke* is written *Holzbruke* and *mehrgleizige Haupt-u vollspurige Nebenbahn* (*sic*) is translated as *double-track main line, full gauge.*

With the experience of 1914–18 behind us it is time for manuals of this kind to show direct relation to the needs of active service. We found, on the Western Front, that few infantry N.C.Os. needed maps, and that most junior infantry officers never had to apply what they had learnt about night-marching and panorama-sketching though they made continual use of grid coordinates. The adjutant of a battalion and the staff-captain of a brigade are much concerned with starting-points and march-tables, but an infantry company commander is more interested in locating enemy machine-guns. The official manual of map-reading (1929) covers the requirements of all arms in any theatre of war. Unofficial manuals for the New Army in particular theatres of war should be specific introductions to, rather than substitutes for, the official manual which every earnest young officer carries.

M. A.

GENERAL

COMPENDIO DI GEOGRAFIA GENERALE. By A. R. TONIOLO. *Messina–Milano: G. Principato*, 1939. $9\frac{1}{2} \times 6\frac{1}{2}$ *inches;* vi+418 *pages; illustrations, sketch-maps, and diagrams. L.* 40

This is a simple text-book, primarily intended for university students, which can also serve as a work of reference for the layman. The four parts into which

it is conveniently divided cover a fairly wide field. Part I defines the aim of the science of geography, deals briefly with cosmography, explains the main principles of cartography and map-reading, and includes the rudiments of geology. The rest of the book is devoted to a concise treatment of physical, botanical, zoological, and human geography. The author has accorded a major space to climatology and bio-geography. He lays stress on the capital importance of these two branches of knowledge for the geographical study of human activities and of economic, and indeed political, systems. He points out that the study of the climatic conditions and of the flora and fauna of the various regions furnishes the data that can most clearly correlate facts and phenomena distributed over the world. The section dealing with human geography is specially interesting. It studies man's reaction to his natural surroundings, showing the part that geographical features play in moulding the economic and social life of a people; it compares earlier modes of travel with those of to-day, demonstrating how the increase in the speed of transport has, as it were, reduced the size of the world; and it treats of various other matters of general interest.

Professor Toniolo has compiled this short work with praiseworthy care, showing much discrimination in concentrating on essentials. The four bibliographies are excellent. F. M. M.

JOURNAL OF A LADY OF QUALITY [*i.e.* JANET SCHAW]; being the narrative of a journey from Scotland to the West Indies, North Carolina, and Portugal, in the years 1774–6. Edited by E. W. ANDREWS and C. McL. ANDREWS. Third edition. *New Haven: Yale University Press* (*London: H. Milford*), 1939. 9×6 *inches; 352 pages; illustrations and end-paper maps.* 22*s* 6*d*

The Lady of Quality was a Scotswoman called Janet Schaw, but little has been discovered about her life, despite the intense research of the editors. Indeed she only survives as the author of the Journal, but as such she deserves her place in history and in literature. The Journal itself, which consists of letters written to a friend, describes a voyage to the West Indies, a short stay in Antigua and St. Christopher, a longer stay in North Carolina, and a visit to Lisbon on the return journey to Scotland. Miss Schaw left the Firth of Forth on 25 October 1774 on the *Jamaica Packet*, which took seven weeks to reach the West Indies. The account of this voyage, during which two severe storms were encountered, brings out the discomforts and dangers which even wealthy and influential sea travellers had to endure in the latter half of the eighteenth century. The hard lot of those who were neither wealthy nor influential is shown by the description of the party of emigrants from the Orkneys who were going out on the *Jamaica Packet* as indentured servants; it sheds some interesting light on this early emigration. On her arrival in the West Indies Miss Schaw visited friends in Antigua and St. Christopher. She was charmed with life on the islands and gives a vivid account of that somewhat exotic society in which she moved and which consisted of the wealthy owners of sugar plantations, then at the height of their prosperity. There is little indication here of the transitory nature of that prosperity, though there are casual references to the possibilities of cattle farming on the plantations where the soil was already exhausted from excessive cropping.

Leaving that "fairy Scene" Miss Schaw reached North Carolina early in February 1775 and stayed there until November of the same year. This part of her Journal is of great historical importance. There is much of interest here on agriculture, which is compared unfavourably with Scottish practice; but the real importance of the account lies in its observations on the political scene.

The colony was preparing actively to play its part in the American War of Independence, and Miss Schaw viewed these activities from a loyalist, conservative standpoint. Thus her account is biased, but it does bring out the violence of the extreme radicals, the difficult position of the loyalists, and the persecution and coercion perhaps inseparable from the early stages of a revolutionary movement. Virtually compelled to flee, the Lady of Quality left behind her a country where she had found "a most disgusting equality," which she could never have understood or appreciated. She returned by way of Portugal in order to visit a friend in Lisbon. Her account of that city is as animated as the rest of the Journal, but perhaps more conventional. With Lisbon, which Miss Schaw did not like "so well as Edinburgh," the Journal ends. It is, as its editors claim, "a literary and human document" which is "of rare interest and importance." Possessing an historical value and a literary excellence not always found together, it well merits the impeccable editing and the fine printing and production bestowed upon it. T. S. W.

THROUGH MIGHTY SEAS, or the romance of a little wind-jammer. By Lieut.-Colonel HENRY HUGHES. *London: W. and G. Foyle*, [1939]. 9×5½ *inches;* 288 (*incl.* xiii) *pages; illustrations.* 10*s* 6*d*

The author made three voyages as a boy in the after cabin of the *Pride of Wales*, a 500-ton barque built at Portmadoc in North Wales in 1868. The ship was twenty-two years old and had suffered a good deal during a long charter in the East Indies; the author joined her in her home port where she had returned for a long refit in 1889. The voyages were to South America and the West Indies, and the account given is full of incident. It loses nothing by the lapse of time, but gives some realistic pictures of life at sea in storm and calm in a wooden vessel with only 3 feet freeboard. As might be expected from the title, much attention is given to bad weather and the descriptive writing is very good. There are some interesting characters in the foc'sle. During a longish outward passage to Martinique the fresh water was spoilt in the Bay, but no suggestion of calling at any Atlantic island to replenish was made by officers or men; they accepted the risk and privation as all in the day's work.

Many books have been written about the clippers and crack ships in the tea and wool trades, but the *Pride of Wales* was one of that big fleet of country ships which carried on the direct trade between the lesser ports at home and abroad. They did their job modestly, and it is good to have this very readable record of one of the last of them. R. H.

VELVET VOYAGING. By EDWARD WASSERMANN. *London: John Lane*, 1940. 8½×5½ *inches;* 316 *pages; illustrations.* 12*s* 6*d*

NINE POUNDS OF LUGGAGE. By MAUD PARRISH. *London: Hutchinson and Co.*, 1940. 9½×6 *inches;* 334 *pages; illustrations.* 18*s*

'Velvet voyaging' is an account of a journey, usually under luxurious conditions and without the restraints imposed by a short purse, from Europe through to the Dutch East Indies, Indo-China, China, and Japan. Most readers will be repelled by the snobbish and egotistic outlook of the author. Inadequate knowledge and a lack of interest in politics are no qualifications for making judgments about people. The author professes profound admiration for the Chinese whilst using the *cliché* "mysterious" to describe their civilization. His judgments of the Japanese are offensive and vulgar, or merely silly. Some of the descriptions, of Bali for example, are good, and show powers of appreciation, and the book as a whole is readable. A lack of insight however and a rather childish impatience prevented the author from making the most of his wide opportunities. The illustrations are good; there is no map.

It is refreshing to turn to Mrs. Parrish's story. At the age of seventeen, after a brief unhappy marriage, she ran away and never settled down again. At sixty, when her book ends, she is still proposing to fill gaps in her experience by visiting two hitherto forbidden spots: Turkistan and Afghanistan. Tibet has also been missed, but not much else. At first she earned her living as an "entertainer," but she "didn't confine her recital to singing and dancing." Actually her most profitable undertaking was a swell gambling establishment in Peking. But the best of her experiences were in the hard and rough places, amongst the lowly and the disreputable, especially in the Far East and amongst the backward peoples of South America and the Pacific. She had much charity for others' failings, as well as her own. Europe is really the mystery for her. She fails to grasp the real significance of Nazi Germany. And she very much exaggerates the supervision and restrictions on travellers in Soviet Russia in 1936, where her judgments seem second-hand. The chapters at the end on the Near East are too hurried to hold the interest. A few errors may be pointed out. The Dowager Empress of China did not fly to Mukden but to Sianfu in Shensi in Boxer days. "Haji Baba" was first published in 1824, not two hundred years ago. The Fatima buried at Ghom (Kum) was not Muhammad's daughter but the sister of Imam Riza. The present Shah of Iran was not a "stable boy" but the son of an Army officer. "Gulistan" is a pure Iranian word, not Arabic. The book is a story of grit, determination, and the power of human sympathy. The vignettes by R. S. Robison provide a charming key to leading incidents. A. S. E.-S.

DAYS OF FRESH AIR: being reminiscences of outdoor life. By L. S. AMERY. *London: Jarrolds*, 1939. $8\frac{1}{2} \times 5\frac{1}{2}$ *inches; 320 pages; illustrations.* 15*s*

To have found time in the midst of his political activities to give us such a breath of fresh air is indeed a feat on the part of the author. From his early days in a London nursery he carries us through Oxford to the Balkans, off again to the South African War, through Canada and Africa and back once more to the Rockies, and there is not a chapter where one is not in touch either with great events of international relations and Empire development or with the personalities who have shaped largely the course of modern history. With such varied characters as Milner and Birkenhead, President Kruger and General Smuts, the author finds common ground in discussing questions of moment or enjoying the delights of travel; and always in the background is his constant affection for the Alps and the freedom of their snows. The book is far more than a vivid narrative of travel incidents, lit by a rare humour and the lamp of his studies in the classical literature of Greece and Rome. Like Odysseus, he has seen the cities of many men and learnt their minds. If one may judge by the photograph entitled "Forty years on," where the author is seen clinging confidently to a limestone crag, there should still be many days of fresh air awaiting him. He has taken us with him as far as 1914, and we want more of his company in the twenty-five succeeding years. H. E. G. T.

THE MONTHLY RECORD

MEDALS AND AWARDS 1940

His Majesty the King has approved the award of the Royal Medals as follows: the *Founder's Medal* to Mr. and Mrs. Harold Ingrams, for their exploration, travel, and studies in the Hadhramaut; and the *Patron's Medal* to Lieutenant Alexander R. Glen, R.N.V.R., for his expeditions in Spitsbergen and North-East Land. The Council have awarded the *Victoria Medal* to Mr. O. G. S. Crawford, for his Archaeological Maps prepared for the Ordnance Survey and his work on the Tabula Imperii Romani; the *Murchison Grant* to Mr. Peter Mott, for his surveys in West Greenland; the *Back Grant* to Mr. Gerald Seligman, for his glacier studies on the Jungfraujoch; the *Cuthbert Peek Grant* to Mr. John Hanbury-Tracy, for his work in south-eastern Tibet with Mr. Kaulback and his journey in the north of South America; and the *Gill Memorial* to Mr. Alexander King, for his work in Jan Mayen in 1938.

GEOGRAPHY AND ITALIAN STUDIES

To help in Italian courses at Hunter College, Mrs. Clough has sketched out a series of lessons under the title of 'Cenni geografici sull'Italia' (Columbia University Press, 1940. 8*s* 6*d*). Written entirely in Italian, with ample explanations in the footnotes, it deals with physical features; the peninsula, province by province; national resources; and overseas possessions. There are exercises to each chapter and maps in the text. The preface states that this is only an outline, successfully expanded in practice by the author, containing simple descriptions and the essential information to serve as background to advanced studies in Italian literature, and as an initiation into the thought and culture of the Italian people. For this however its conception of geography is too narrow. A geographer would probably find in regional grouping (or, if political divisions must be followed, those of the eighteenth or early nineteenth centuries) a more satisfactory basis: the division of northern Italy into Lombardia, Venezia Tridentina, and Venezia Euganea avoids political awkwardness but disguises essential facts. In Mrs. Clough's lists of provinces, capitals, physical features, names recur which have little but a modern and administrative significance. The "independence" of San Marino receives its due; Rimini (mentioned only as a bathing resort) and Urbino contributed more to Italian history and literature. Ravenna's ancient churches are mentioned, but there is no hint as to why it replaced Rome as a capital, no reference to the slow retreat of the sea. Climate and its influence on settlement are ignored. We are repeatedly told that names of provinces derive from former inhabitants; nothing more is said about them: in Perugia at least their visible achievements might be mentioned. The modern manufacture of straw hats in the Val d'Arno is noted, but not Livorno, a seventeenth-century experiment as a Free Port, which gave its name to straw hats and hens. The author might have used geography to explain the countless wars in Italy. Nothing in the section on Lombardy recalls D'Azeglio and the defence of Vicenza in 1848; nor will readers of his 'Ettore Fieramosca' find in the section on Puglia any reference to the campaigns of Gonzalo de Córdoba against the French in 1502. Geography might elucidate Cesare Borgia's campaigns and the struggle to create a central Papal state. Occasional descriptive passages cited are mainly from non-Italian sources or tourist handbooks. Hence the survival of the legend of Genoa as a city of palaces. Its shipbuilding seems of less account; as with Venice, where the growth of Mestre is discreetly overlooked. Venice, too, former centre of trade with the East, is singled out as having been ruined by the

discovery of America. Florence possesses an "incanto affascinante," but there is no hint that this had aught to do with wool or banking. There is room for a geography to counteract separatism in historical and literary courses in Italian, somewhat on the lines indicated by Mrs. Clough, but planned to treat the subject by regions, periods, or selected topics.

REICHENAU AND HANDSCHUHSHEIM

Dr. Freudenberg has written a brief monograph ('Die Insel Reichenau, das Dorf Handschuhsheim.' Universitäten Freiburg i. Breisgau u. Heidelberg, 1939) on the economic geography of two small and hardly comparable regions: the island of Reichenau, lying in lake Constance between Radolfzell and the town of Constance, and the country around the village of Handschuhsheim on the Bergstrasse north of Heidelberg. Reichenau forms part of the economic region which includes the lake shores of Constance as well as the island, a part of Baden which is noted for its sunny climate, rich drift soils, and its specialization in orchard-fruit cultivation and viticulture. The drier north-eastern side of the island under cereals is contrasted with the wetter south-west, under grass, and the local difference in rainfall in an island not a mile wide is said to be due to the rain-shadow effect of the Black Forest. There is a drumlin which crosses the island from west to east, and since westerly or south-westerly winds prevail here, this feature may account for some slight local difference in rainfall. Reichenau is given over to intensive cultivation of the horticultural type, the chief crops being vegetables, potatoes, and beans (sometimes intercropped with the vine), and they find a ready market in the lake-shore towns, especially Constance. The vineyards were formerly much more extensive (maps are included showing the land under the vine in 1707, 1876, and 1938). Nothing is said of the part played by the early monastic foundation at the western end of the island in promoting viticulture in medieval times, or of the change in the character of the island when it became tied to the mainland by a causeway carrying a good motor road. Handschuhsheim-Neunheim lies in a region of similar intensive cultivation, between the thickly settled Rhine plain and the wooded hills of the Odenwald. Gardens and fruit orchards cover the southern slopes dominating the Neckar gorge, while bordering the Bergstrasse the cultivation of vegetables and the vine prevails. Dr. Freudenberg regrets the appearance here of *Ersatz* American vines, for they grow too tall to permit the intercropping possible with German stocks. There is a supplementary folder of maps reproduced from rather rough drawings. They are on the unwieldy scale of 1/5000, and are brightly coloured samples of land utilisation survey. But whether it is necessary to publish the precise use of each small parcel of mixed cultivation is not so clear.

A. F. A. M.

THE YUNNAN–BURMA ROAD

We are indebted to Professor C. G. Beasley, of Rangoon, for the following information:

The discussion following Mr. Patrick Fitzgerald's interesting paper, "The Yunnan–Burma road," published in the March number of the *Journal*, revealed a quite inadequate appreciation of the success of this highway and of the volume of trade which is already passing over it. The trade now goes from the rail-head at Lashio, and in the eleven months from the first of April to the end of February 1940, commodities to the value of two million pounds sterling passed over the road from Burma to China in addition to a large volume of munitions and war supplies, the figures for which are not disclosed by the Government of Burma. A great variety of items is included in this trade, the most important single branch of which consists of motor omnibuses, vans, and lorries, with spare parts

and pneumatic covers and tubes, which account for nearly half of the total trade. Other important items include petroleum, cotton piecegoods and blankets, machinery of all kinds, hardware, steel bars, drugs and medicines, and chemicals.

The success of the road has in fact exceeded all expectations, and the existing volume of commercial traffic would have been greatly increased were it not for the vital necessity of giving precedence to the passage of war supplies. No doubt the nature of this traffic is fundamentally artificial and no sound inferences can yet be drawn as to its chances of survival in normal circumstances. It is desirable however that wider publicity should be given in England to the great achievements of the Chinese in the rapid development of manufacturing activities in the western provinces, and the large part that is being played therein by the maintenance of this new link with Burma.

THE UNITED STATES ANTARCTIC SERVICE

In the *Journal* for February, p. 156, we gave a preliminary account of the project for an official expedition under the command of Rear-Admiral Byrd, to operate from two "semi-permanent" stations in the Antarctic, of which one would be Little America on the Bay of Whales and the other 1000 miles or more to the east at a point to be determined by ice conditions and accessibility. By the courtesy of the Scott Polar Research Institute, which has allowed us to see its collection of newspaper cuttings, we are now able to give a fuller account of this project.

On 1 November 1939 the Antarctic Service released to the Press a memorandum setting out the threefold purpose of the expedition. "Any decision concerning territorial claims on the Antarctic Continent must be made by the Department of State, but one of the primary purposes of the expedition will be to strengthen any future claims of this Nation by consolidating the work of previous American explorers in the Antarctic, namely, Captain Nathaniel Palmer, Lieut. Charles Wilkes, Rear Admiral Richard E. Byrd, and Lincoln Ellsworth. Secondly, the expedition will attempt by airplane, ship, tractor, and dog sledge to chart the thousand miles of unknown coast line lying between Marie Byrd Land and Alexander Land . . ."; and thirdly, the scientific staff will pursue research in many branches of science.

The ships of the expedition are two: the U.S. Coastguard cutter *Bear*, the ship used by Byrd on his last expedition and then named *Bear of Oakland*, and the Interior Department vessel *North Star*. For transport they have four airplanes, two army tanks, two tractors, 140 dogs, and the Snow Cruiser which was first described as a 27-ton motor fitted with caterpillar wheels 10 feet in diameter to negotiate crevasses, but is now described as 55 feet long, 19½ feet wide, and 15 feet high, riding on rubber-tyred wheels 10 feet in diameter, and powered by two 200 H.P. Diesel engines; with a machine shop, galley, control cabin, and chart room, and fully equipped to carry a crew of four for a year. [There is a full account of the Snow Cruiser in *The Engineer* for 3 May 1940: the engines are there said to be of 150 H.P.]

Each base has several pre-fabricated, heavily insulated buildings including living quarters with double floors, a science laboratory, and generator house.

News bulletins are sent by the Information Officer to the U.S. Antarctic Service and are by them released to the press. The following summary is taken from the *New York Times*. On January 16 Admiral Byrd reported that the *Bear* and *North Star* had arrived in the Bay of Whales and were unloading. The Snow Cruiser had been got ashore from the *North Star* with some difficulty, its weight breaking down the ramp which had been raised to the level of the ship's rail. On January 22 Byrd made his first flight of the season over the coast-line 300 miles

east from the Bay of Whales and found a lead by which the *Bear* reached the eastern limits of Sulzberger Bay. A flight on January 26 verified the discovery of a new mountain range on a flight of the previous day. Meanwhile the *North Star* had finished unloading and had left for Valparaiso. On February 4 the *Bear* left the West Base, near Little America in about long. 166° W., and proceeded to the western side of the Ross Sea, while on February 13 Doctor Siple, commanding the West Base, made further flights eastward and found two extinct volcanoes. On February 7 the *Bear* established a magnetic station on the shelf-ice near the Drygalski Ice Tongue and obtained a bearing of the Magnetic Pole confirming Mawson's position of 1912.

The *North Star* reached Valparaiso on February 16 with five of the expedition returning home, including Doctor Poulter, the designer of the Snow Cruiser. On February 18 Byrd was having a rough passage eastward to place the Eastern Base, while the western party found further indications that the Ross Barrier is aground about those longitudes. On February 25, from a position in the pack 70° 43′ S. and 108° 25′ W., Byrd made a flight southward to the Antarctic coast about 190 miles south of the vessel's position, and on the following day Lieutenant Dufek made another successful flight to photograph the coast. On February 27, from a position in the ice 70° 04′ S., 95° 19′ W., Byrd made another flight to the coast, but does not report its position. The *Bear* then proceeded to Marguerite Bay in Graham Land, and on about March 11 was joined by the *North Star*. The expedition selected for their Eastern Base a small island in Marguerite Bay near Neny Island, a few miles south of Rymill's southern base, and unloading began on March 13, much interrupted by gales. About March 19 the landing of stores was completed and the *Bear* with Admiral Byrd left for Punta Arenas, where she arrived on March 30. The *North Star* reached Valparaiso on the same day.

Meanwhile a despatch to the *New York Times* dated Washington, March 4, tells that the House Appropriations Committee had refused that day to recommend $250,000 for the expedition's expenses during the 1941 fiscal year which begins on 1 July 1940, and had refused also to provide the $171,000 dollars required alternatively to bring it home. The Committee stated that its original appropriation was made in the belief that the expedition would be terminated within a year or two, but that the Bureau of the Budget recommendation and other testimony indicated that the expedition was for purposes of "occupation" of the region to enhance the claim as a possession of the United States. The published hearings of the Committee however indicated that opposition to continuing the expedition as a Federal project had arisen because a Representative from Oklahoma took objection to certain advertising and radio contracts. A later despatch from Washington, dated April 5, says that the President had at a Press Conference that day "prodded Congress to make another appropriation for the government's South Pole expedition."

It may be observed that both the Eastern and Western bases are in British territory: the Eastern in the Falkland Islands Dependencies, which have been under continuous British administration since 1908; the Western in the Ross Dependency, which was in 1923 constituted a British Dependency under the jurisdiction of the Dominion of New Zealand (*Geogr. J.* 62 (1923) 362).

OBITUARY

PROFESSOR JULES SCHOKALSKY

We record with regret the death of our Honorary Member Professor Jules Schokalsky (Yuli Mikhailovich Shokal'ski), of Leningrad University, on 26 March 1940, at the age of eighty-four.

He was brought up for the Russian Navy, but leaving the sea while yet a midshipman he passed the greater part of his life in the service of the Russian Admiralty as Librarian for a time, and later as Professor of Physical Geography, Meteorology, and Oceanography in the Naval Academy.

Besides his official work he undertook many researches as to methods of determining altitudes and the construction of hypsometrical maps. He recently completed a hypsometrical map of European Russia in six sheets on a scale of 1/2½M. His most important original work however was on the limnology of Lake Ladoga and the oceanography of the Black Sea. He planned and conducted both of these extensive investigations and obtained results of much value. As an author his most important work was the treatise on oceanography brought out in 1917, but published only in Russian.

He was long connected with the Russian Geographical Society and was President successively of the Physical Geography Section and of the whole Society. He remained in this post after the Russian revolution of 1917, and was Honorary President at the time of his death. Professor Schokalsky had a wide knowledge of geographical literature, and by his frequent visits to international congresses and committees in many of the countries of Europe and America he had a very extensive personal acquaintance with leading geographers and specialists on all the allied sciences. He maintained the continuity of his work and correspondence to the end of his life despite the viscissitudes of fortune and the difficult political conditions of his country. H. R. M.

THE REVEREND WALTER WESTON

In Walter Weston, who died in London on March 27, the Society has lost an old and valued member, who had been a Fellow close on fifty years (he joined in 1892) and had done good service to geography in the field and Council Room, as well as by his books.

A Derbyshire man by birth, he retained his affection for his county throughout his life, and was always keen on extolling both its natural beauties and the sterling character of its sons. Born in 1861, he was educated at Derby School and at Clare and Ridley Hall, Cambridge, taking Holy Orders in 1885. His long association with Japan and its people, with which his name was especially linked, began in 1888, when he started missionary work at Kuamoto, soon afterwards becoming British Chaplain at Kobe. With intervals spent in parish work at home he held various posts in Japan till 1915, latterly as British Chaplain at Yokohama. A keen lover of mountains, he was greatly attracted by the Japanese Alps, which he may be said to have discovered as a field for mountaineering exploits, and he had many pioneer ascents to his credit. In many of these he had the company of his wife, daughter of Sir Francis Fox, herself an ardent and noted mountaineer, whom he had married in 1902. Besides such ascents, he did actual exploring in the inner recesses of the range, and the value of his work was recognized by this Society in the award of the Back Grant in 1917. Long before

this he had been well known at the Society for the accounts of his travels given at Evening Meetings, one of the more important being in 1915. His books on mountaineering and other aspects of Japanese life and nature gained him an acknowledged standing as an authority on that country.

Keeping in close touch with his Japanese friends, to many of whom he gave valuable help during their visits to this country, Weston spent most of his latter years at home, engaged in various useful activities, not the least being his warm support of the Missions to Seamen. He was also a University Extension Lecturer and Lecturer for the Gilchrist Educational Trust. He served on the Society's Council, with a brief intermission, from 1924 to 1932, and took a keen interest in its work, attending its meetings with conscientious regularity. He took a personal interest in the members of the Society's permanent staff, by many of whom he was looked upon as a real friend. He also served on the Council of the Japan Society and was a member of the Alpine Club. It was a well-earned distinction that he was the first to be elected an Honorary Member of the Alpine Club of Japan. In 1937 he suffered a severe blow through the death of his devoted wife, of whom an obituary notice appeared in the *Journal* for September of that year. E. H.

SIR HUBERT MURRAY, K.C.M.G.

With the death of Sir Hubert Murray on 22 February 1940 an outstanding figure vanishes from this world. He had been Lieutenant-Governor of Papua since 1908 and was in his seventy-ninth year. New Guinea is so remote that few realize how unique an administrative experiment has been carried out with great success. The pacification of a dense population of primitive people possessing the mentality of Stone Age men, and the introduction of white people without disturbing native cultures are no mean achievements. It is true that Sir Hubert's predecessors originated the policy of the government, but it was he who put it into form, and devoted himself exclusively to building it up, never to the end of his life relaxing his keen supervision of every detail of the work. Much was entirely due to his own personality, particularly the remarkable *esprit de corps* among the poorly paid, hard-worked members of the government service. Some of the most difficult feats of exploration in New Guinea have been carried out as part of the routine work of patrol officers, simply for the honour of the colony. This was in response to Sir Hubert's influence. Still more remarkable was the prestige which Judge Murray, as they always called him, had won among all Papuans throughout the Territory, especially among the Native Constabulary, through which the bush population has been gradually brought under control.

Probably no one white man will ever inspire again the same genuine respect in so large an area of New Guinea, a respect in which *mana*—supernatural prestige—of course played a large part. From Papuan servants at different times the writer of this notice learnt of various attributes which together made up that reputation. His stature, for instance; his concise speech ("'e no talky-talky all de time!"), his habitual gravity, and also his appreciation of a joke. All Papuans too had a wholesome awe of his intuition and shrewd judgment when he passed verdict on the terribly involved "court cases," which are the joy of their lives.

The most poignant revelation of what the ideals of the Papuan police force mean to those natives, and the *mana* attached to the wearing of its very simple serge uniform, was made by a police boy who succumbed to fever during one of Jack Hides' patrols. His dying words were, "My light is going out—but—I am wearing Judge Murray's clothes."

LIEUT.-COLONEL SIR TRENCHARD FOWLE, K.C.I.E., C.B.E.

Lieut.-Colonel Sir Trenchard Fowle, who died on 23 February 1940, had been a Fellow of the Society since 1910. Born in 1884, he entered the army and in 1907 was transferred to the 40th Pathans. He took part in the Mohmand operations and subsequently journeyed in Turkish Arabia, Syria, and Persia, describing his experiences in 'Travels in the Middle East,' which was published in 1916. From 1915–18 he was Political Officer with the British Forces in Mesopotamia, returning to India after the war. In 1925 he was First Assistant Resident at Aden, and served later at Bushire and Muscat. In 1932 he became Political Resident in the Persian Gulf, holding this post until his retirement in 1939.

MEETINGS: SESSION 1939–40

Eighteenth Meeting, 22 April 1940. The President in the Chair

Elections: Rowland Bowen; Charles Edward Cleeves; Thomas Edwin Wiley Durrans, M.A.; Robert B. Gough, M.A.; William Desmond Grier; The Rt. Hon. the Countess of Mayo; Kenneth Naylor; Mrs. Eileen Austin Phillips; Mrs. E. Joy Renold; The Reverend Ernest Thorburn; The Reverend Clement Egbert Warrington; Miss Veronica Seton-Williams

Paper: The evidence for ancient mining. By Mr. C. E. N. Bromehead

Nineteenth Meeting, 6 May 1940. The President in the Chair

Elections: Robert W. Hambrook; Walter William Knight; George Leslie Lay; Alfred Sandwell; Alexander Cecil Sellars; Dr. H. L. Slaughter; Thomas Lomax Spencer; Lieutenant John P. Walsh; Miss Mona Isabel Woodhead, B.A.

Paper: The British West Indies in 1939. By Lord Moyne